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United States
Department of
Agriculture

Cooperative State
Research Service

S24

Food and Agriculture Competitively Awarded Research and Education Grants

Fiscal Year 1987

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FOOD AND AGRICULTURE
COMPETITIVELY AWARDED
RESEARCH AND EDUCATION GRANTS
FISCAL YEAR 1987

UNITED STATES
DEPARTMENT OF
AGRICULTURE

PREPARED BY THE OFFICE OF GRANTS
AND PROGRAM SYSTEMS, COOPERATIVE
STATE RESEARCH SERVICE

FEBRUARY 1988

FOREWORD

This year marks the 100th Anniversary of the Hatch Act. This act initiated the State-Federal partnership that in many respects helped to make this country the great nation it is today. To maintain our competitiveness in agriculture in the world marketplace, scientific research holds the key. This is accomplished through a number of programs. This publication reports the support provided through the following grant programs: Competitive, Special, Forest and Rangeland Renewable Resources, Rangeland, External Combustion Engines, and Small Business Innovation Research, as well as the Food and Agricultural Sciences National Needs Graduate Fellowships. Collectively, the focus is primarily on basic research or education to discover the information needed before further important and necessary breakthroughs can be made in the applied research program.

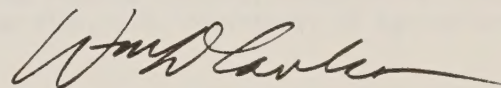
The Competitive Research Grants Program was developed to bring to bear upon agricultural research needs the best scientists in the Nation. Qualified scientists both inside and outside of the traditional agricultural research system may compete for and receive these grants.

The primary aim of the agriculturally oriented basic research programs of CSRS is discovering new information needed for progress in biotechnology, animal sciences,

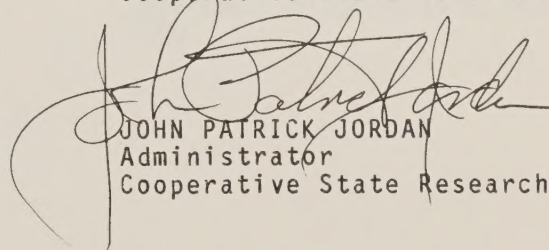
insect sciences, plant sciences, and human nutrition. Other areas supported by grant programs include animal health, aquaculture, and alcohol fuels research as well as areas of the food and agricultural sciences suitable for graduate work.

During fiscal year 1987, 524 competitive grants totaling \$57,116,070 were awarded.

It is our belief that this combination of an ongoing research system with a viable extramural grants program to attack significant and difficult problems in agricultural science provides the basic information and knowledge necessary to reduce costs and solve pressing problems to keep U.S. agriculture strong, resilient, and competitive, thus ready and able to meet any challenge that might be ahead.



WILLIAM D. CARLSON
Acting Associate Administrator
Office of Grants and Program Systems
Cooperative State Research Service



JOHN PATRICK JORDAN
Administrator
Cooperative State Research Service

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This publication was prepared by the Grants Administrative Management Staff, Office of Grants and Program Systems, Cooperative State Research Service, U.S. Department of Agriculture.

Copies are available from the Publication Requests and Distribution Section, Information Staff, Room 3431 South Building, Extension Service, U.S. Department of Agriculture, Washington, D.C. 20250-0900

FOOD AND AGRICULTURE
COMPETITIVELY AWARDED RESEARCH AND EDUCATION GRANTS
FISCAL YEAR 1987

THE GRANTS PROGRAMS

The research grants programs of science and education under which the competitive selection process was used during fiscal year 1987 were the following:

1. Competitive Research Grants Program to support basic research in the food and agricultural sciences
2. Special Research Grants Program to support research deemed by Congress and the Department of Agriculture to be of particular importance to the Nation
3. Forest and Rangeland Renewable Resources Program to support basic research in the areas of harvesting, wood utilization, and forest biology.

These sources of funding supplement and complement funding of Federal agricultural research and the basic State research institution formula funding by Congress to help maintain a viable, effective, ongoing State-Federal agricultural research capability for this country.

In addition, grants were awarded competitively under the following programs:

4. Research on and Development of External Combustion Engines to support studies on the use of fuel other than that derived from petroleum and petroleum products.

5. Rangeland Research Grants Program to support basic research in certain areas of rangeland research.

6. Small Business Innovation Research Program, a primary aim of which is to stimulate technological innovation in the private sector.

7. Food and Agricultural Sciences National Needs Graduate Fellowships Grants Program to help develop professional and scientific expertise in the food and agricultural sciences.

Grant funds for all of the above programs are administered through the Cooperative State Research Service.

Guidelines for grants to be awarded competitively are published annually in the Federal Register, usually near the end of each calendar year. The guidelines identify selected research areas, anticipated funding levels, and requirements for the submission of proposals.

Single copies or annual or semiannual subscriptions for the Federal Register are available for a small charge from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

If you want further information on programmatic aspects of these grants, contact:

Dr. William D. Carlson
Acting Associate Administrator
Office of Grants and Program Systems
Cooperative State Research Service
U.S. Department of Agriculture
14th and Independence Avenue, S.W.
Washington, D.C. 20250

If you want information on administrative aspects of these grants, contact:

Mr. Terry J. Pacovsky
Chief
Grants Administrative Management
Office of Grants and Program Systems
Cooperative State Research Service
U.S. Department of Agriculture
15th and Independence Avenue, S.W.
Washington, D.C. 20251-2200

The following are listings of awards (arranged by program areas) for fiscal year 1987. Please note that some of these awards are renewals/amendments to existing projects and are identifiable by agreement periods starting prior to October 1, 1986.

COMPETITIVE RESEARCH GRANTS PROGRAM

The following tabulation lists the funds awarded in the various areas in fiscal year 1987 under the Competitive Research Grants Program.

Plant Science	\$11,008,176
Biological Nitrogen Fixation	\$1,713,412
Biological Stress on Plants	4,949,400
Genetic Mechanisms for Crop Improvement	1,818,000
Photosynthesis	2,060,000
Soybean Research	467,364
Human Requirements for Nutrients	\$ 2,253,396
Biotechnology	\$18,027,168
Plant Molecular Biology	3,399,878
Plant Growth and Development	3,643,290
Response to Physical Stress (Plants)	1,793,000
Response to Biological Stress (Entomology)	971,000
Response to Biological Stress (Plant Path)	1,620,000
Animal Molecular Biology	3,525,000
Animal Growth and Development	3,075,000
Animal Science	\$4,056,492
Insect Pest Science	\$2,704,644
Alcohol Fuels Research	\$ 487,272
TOTAL	\$38,537,148

This program is administered under the authority of Section 2(b) of P.L. 89-106, 7 U.S.C. 450i(b), as amended by Section 1414(b) of P.L. 95-113 and Section 1415(a) of P.L. 97-98, and in accordance with Sections 6301-6308 of P.L. 97-258. Section 1419 of P.L. 95-113, as amended, authorized grants for the Alcohol Fuels Research Program.

U.S. colleges and universities, other research institutions, Federal agencies, private organizations or corporations, and individuals may submit proposals.

PLANT SCIENCE

Grants are awarded in four broad areas of research in plant biology: nitrogen fixation and metabolism, biological stress on plants, genetic mechanisms for crop improvement, and photosynthesis. A brief description of each area of research, with a listing of research grants made during fiscal year 1987, follows.

Additional research grants covering the same four broad areas of plant science and focusing on biotechnology are awarded under the Biotechnology program and listed in the Biotechnology section in this book. Proposals addressing similar scientific problems were reviewed by a single technical advisory panel regardless of the source of funds for the grants.

Biological Nitrogen Fixation

Grants in this area support research to find ways to naturally increase the nitrogen available to plants. Lack of nitrogen for plant growth is the most common limiting factor in crop agriculture. This research will contribute to understanding nitrogen-fixing mechanisms in both symbiotic and free-living organisms, as well as the fate of fixed nitrogen.

The objective of this research is to build a foundation of basic information concerning nitrogen fixation, related nitrogen metabolism and nitrogen cycling. This information should help in the enhancement of the process in currently known systems and provide a base for developing new nitrogen-fixing associations, by genetic transfer or other means, for crop species not now possessing such capability.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	John B. Neilands	85-CRCR-1-1633 8702802	\$50,000	09-01-85 08-31-88	Iron Assimilation in Symbiotic Nitrogen-fixing Microorganisms
Univ. of California Davis, CA 95616	Donald A. Phillips	87-CRCR-1-2552 8700987	\$100,000	09-01-87 08-31-89	The Effect of Flavonoids on Nodulation and Growth in Alfalfa
Univ. of California Irvine, CA 92717	Barbara K. Burgess	85-CRCR-1-1635 8702764	\$70,000	08-01-85 07-31-88	Substrate Reactions of Nitrogenase
Univ. of Connecticut Storrs, CT 06268	David R. Benson	85-CRCR-1-1657 8701457	\$90,000	07-01-85 06-30-89	Developmental Biology of <u>Frankia</u>
Univ. of Florida Gainesville, FL 32611	Robert R. Schmidt	87-CRCR-1-2476 8701385	\$90,000	09-01-87 08-31-89	Sequences of 2 Ammonia-induced Glutamate Dehydrogenases, their Genes and mRNAs
Univ. of Chicago Chicago, IL 60637	Robert Haselkorn	87-CRCR-1-2452 8701374	\$55,000	07-01-87 06-30-88	Rearrangement of Fixation Genes in Cyanobacterial Heterocyst Differentiation
Northwestern Univ. Evanston, IL 60201	Brian M. Hoffman	87-CRCR-1-2430 8701573	\$55,000	08-01-87 07-31-88	Single-Crystal and Solution ENDOR Studies of Nitrogenase

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Northwestern Univ. Evanston, IL 60201	Brian Hoffman	87-CRCR-1-2553 8701456	\$4,000	09-01-87 03-31-88	Gordon Research Conference on Metals in Biology
Purdue Res. Fdn. West Lafayette, IN 47907	Jeffrey T. Bolin	87-CRCR-1-2429 8701602	\$55,000	08-01-87 07-31-88	Three-Dimensional Structure of Nitrogenase
Kansas State Univ. Manhattan, KS 66506	R. Krishnamoorthi	87-CRCR-1-2396 8701262	\$88,000	07-15-87 07-31-89	Nuclear Magnetic Resonance Investigation of Nitrite Reductase
Amherst College Amherst, MA 01002	David M. Dooley	87-CRCR-1-2477 8701618	\$90,000	09-01-87 08-31-89	Active Site Structure and Function of Copper Enzymes in Denitrification
Harvard Univ. Cambridge, MA 02138	John G. Torrey	87-CRCR-1-2461 8701450	\$55,000	08-01-87 07-31-88	Causes of Ineffective Root Nodulation in Actinorhizal Plants
Univ. of Maine Orono, ME 04469	John D. Tjepkema	87-CRCR-1-2431 8701337	\$55,000	09-01-87 08-31-88	Nitrogen Fixation in Actinorhizal Plants: Hemoglobins and Gas Exchange
Univ. of Maine Orono, ME 04469	Christa Schwintzer	87-CRCR-1-2440 8701341	\$90,000	09-01-87 08-31-89	The Ecology and Physiology of Nitrogen Fixation in Actinorhizal Plants
Michigan State Univ. East Lansing, MI 48824	Michael Thomashaw	85-CRCR-1-1739 8702768	\$65,000	08-15-85 08-31-88	Developmental and Physiological Gene Regulation in the <u>Rhizobium/Legume Symbiosis</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Missouri Columbia, MO 65211	David W. Emerich	85-CRCR-1-1734 8701620	\$110,000	09-01-85 08-31-89	Symbiotic Nitrogen Fixation: The Role of Malate
Univ. of Missouri* Columbia, MO 65211	Dale G. Blevins	87-CRCR-1-2466* 8701617	\$5,000*	08-01-87 07-31-89	Ureide Metabolism in Nodulated Soybeans
Dartmouth College Hanover, NH 03755	Dean E. Wilcox	87-CRCR-1-2485 8701614	\$90,000	08-01-87 07-31-89	The Catalytic Mechanism of Urease
Ohio State Univ. Res. Fdn. Columbus, OH 43212	John G. Streeter	87-CRCR-1-2511 8701179	\$55,000	09-01-87 08-31-88	Role of α,α -trehalose in <u>Rhizobium</u> and the <u>Rhizobium-Legume Symbiosis</u>
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Wolfgang D. Bauer	86-CRCR-1-2118 8702828	\$50,000	09-15-86 09-30-88	Mechanisms Regulating Nodule Formation in Soybean
Oregon State Univ. Corvallis, OR 97331	Harold J. Evans	87-CRCR-1-2472 8701313	\$98,790	09-01-87 08-31-88	Regulation of Expression of Hydrogen Recycling Genes in <u>Bradyrhizobium japonicum</u>

*Split-funded with Soybean research area for the amount of \$120,664.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Oregon State Univ. Corvallis, OR 97331	Peter J. Bottomley	87-CRCR-1-2471 8701603	\$110,000	08-01-87 07-31-89	Nodulation and Autecology of Soil-Borne <u>Rhizobium trifolii</u>
Univ. of Tennessee Knoxville, TN 37996	Gary Stacey	87-CRCR-1-2512 8701454	\$55,000	09-15-87 09-30-88	Genetics of Auxin Synthesis in <u>Bradyrhizobium japonicum</u>
Univ. of Wisconsin Madison, WI 53706	Eric W. Triplett	87-CRCR-1-2571 8701543	\$90,000	09-15-87 09-30-89	Trifolitoxin: Structure, Mode of Action, and Genetics of Production
Univ. of Wisconsin* Madison, WI 53706	Gary P. Roberts	87-CRCR-1-2561* 8701402	\$37,622*	09-01-87 08-31-89	Analysis of a Regulatory System for Nitrogenase in <u>Rhodospirillum rubrum</u>

TOTAL \$1,713,412

*Split-funded with Biotechnology-Plant Molecular Biology/Nitrogen Fixation research area for the amount of \$72,378.

Biological Stress on Plants -
Entomology/Nematology

Research grants in this area support studies on stresses on plants arising from their interactions with insects, nematodes, or other invertebrates such as mites. The ultimate goal of the program is to support research which will lead to ways of reducing losses in plant productivity from damage caused by these organisms.

Research into the basic biology of these invertebrates is encouraged as is research on plant/invertebrate interactions. Specific emphasis is placed on but not limited to the following areas: invertebrate growth, development, and reproduction (physiology, biochemistry and molecular biology); mechanisms (biochemical and genetic) of plant defenses against invertebrate attack; physiological and ecological interactions of invertebrate control agents (invertebrates, virus, bacteria, fungi and other microorganisms) with their hosts; invertebrate behavioral physiology; population dynamics on the genetic, ecological and evolutionary level; and fundamental basis of pesticide toxicity and resistance.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - ENTOMOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Arkansas Fayetteville, AR 72701	Rose C. Gergerich	87-CRCR-1-2355 8700493	\$120,000	07-01-87 06-30-89	The Role of Regurgitant and Virus Translocation in Virus Transmission by Beetles
Northern Arizona Univ. Flagstaff, AZ 86011	Thomas G. Whitham	87-CRCR-1-2361 8700709	\$100,000	08-01-87 07-31-89	Interaction of Herbivory, Stress, and Host Resistance in Pinyon Pine
Univ. of Arizona Tucson, AZ 85721	Haruhiko Itagaki	87-CRCR-1-2362 8700458	\$120,000	09-01-87 08-31-90	Central Processing of Chemosensory Information in Larval Pest Lepidoptera
Univ. of Arizona Tucson, AZ 85721	T. A. Christensen	87-CRCR-1-2434 8700470	\$90,000	08-01-87 07-31-89	Central Processing of Behaviorally Relevant Odors in Pest Insects
Univ. of California Davis, CA 95616	Sean S. Duffey	87-CRCR-1-2371 8700693	\$100,000	07-01-87 06-30-89	Biochemical Factors Affecting Use of Plant Nitrogen by Herbivorous Insects
Univ. of California Riverside, CA 92521	C. J. Lovatt	87-CRCR-1-2288 8700240	\$90,000	07-01-87 06-30-89	Nematode Root Infection Causes Ammonia Toxicity, Reduces Hormone Levels and Bloom

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - ENTOMOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Florida Gainesville, FL 32611	Pauline O. Lawrence	87-CRCR-1-2383 8700433	\$90,000	08-01-87 07-31-89	Host-Initiated Molting of a Fruit Fly Parasitoid: An Investigation <u>in vitro</u>
Univ. of Illinois Urbana, IL 61801	R. A. Larson	87-CRCR-1-2374 8701040	\$100,000	09-01-87 08-31-89	Phototoxic Plant Defensive Compounds and their Modes of Action
Univ. of Illinois Urbana, IL 61801	Robert L. Metcalf	87-CRCR-1-2373 8700115	\$100,000	08-01-87 07-31-90	Chemical Ecology of Diabroticites: Basic and Applied Aspects
Purdue Res. Fdn. West Lafayette, IN 47907	Larry L. Murdock	87-CRCR-1-2297 8700420	\$100,000	07-01-87 06-30-90	Proteinase Inhibitors for Host Plant Resistance
Purdue Res. Fdn. West Lafayette, IN 47907	V. R. Ferris	87-CRCR-1-2289 8700654	\$100,000	09-01-87 08-31-89	2-D Protein Patterns in Cyst Nematodes
Kansas State Univ. Manhattan, KS 66506	Marion O. Harris	87-CRCR-1-2412 8700527	\$100,000	08-01-87 07-31-90	Quantifying Behavioral Responses of Adult Hessian Flies to Host and Non-hosts

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - ENTOMOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Kentucky Res. Fdn. Lexington, KY 40546	Kenneth F. Haynes	87-CRCR-1-2410 8700668	\$120,000	07-01-87 06-30-89	Redundancy in Chemical Communication as a Buffer Against Environmental Noise
Univ. of Kentucky Res. Fdn. Lexington, KY 40506	Paul A. Weston	87-CRCR-1-2348 8700675	\$100,000	06-01-87 05-31-89	Tomato Trichome-mediated Resistance to Spider Mites and Its Stability
Louisiana State Univ. & A & M College Baton Rouge, LA 70803	Thomas C. Sparks	87-CRCR-1-2384 8700428	\$90,000	09-01-87 08-31-89	Regulation of JH Metabolism in Pest Lepidoptera
Univ. of Massachusetts Amherst, MA 01003	Ronald J. Prokopy	87-CRCR-1-2385 8700564	\$50,000	09-01-87 08-31-88	Food Foraging Behavior of Apple Maggot and Mediterranean Fruit Flies
Univ. of Maryland College Park, MD 20742	Pedro Barbosa	87-CRCR-1-2363 8700275	\$90,000	08-01-87 07-31-89	The Role of Tri-trophic Level Interactions in Localized Specialization of Parasitoids
Michigan State Univ. East Lansing, MI 48824	J. M. Scriber	87-CRCR-1-2581 8700616	\$150,000	09-15-87 09-30-90	Chemical Ecology of Papilionidae: Physiology and Biochemistry of Host Plant Use

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - ENTOMOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
North Carolina State Univ. Raleigh, NC 27695	R. J. Lindermann	87-CRCR-1-2417 8700634	\$100,000	09-01-87 08-31-89	Design, Synthesis and Assay of Inhibitors of Juvenile Hormone Esterase
North Carolina State Univ. Raleigh, NC 27695	George G. Kennedy	85-CRCR-1-1615 8702371	\$50,000	07-01-85 06-30-88	Mechanisms of Multiple Insect Resistance in a Wild Tomato Species
Univ. of Nevada Reno, NV 89557	M. de Renobales	87-CRCR-1-2293 8700346	\$100,000	07-01-87 06-30-89	Biosynthesis of Insect Cuticular Lipids-Potential for Insect Control
Cornell Univ. Ithaca, NY 14853	Maurice J. Tauber	87-CRCR-1-2376 8700301	\$90,000	08-01-87 07-31-89	Phenological Responses of Colorado Potato Beetle to Resistant Potato Varieties
Cornell Univ. Ithaca, NY 14853	Sara Via	87-CRCR-1-2375 8700578	\$45,000	08-01-87 07-31-88	Experimental Estimates of the Potential for Evolution in a Crop Pest
Cornell Univ. Ithaca, NY 14853	Anthony M. Shelton	87-CRCR-1-2422 8700276	\$100,000	07-01-87 06-30-90	Habitat Selection by an Aphid Parasitoid

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - ENTOMOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Paul L. Phelan	87-CRCR-1-2294 8700621	\$100,000	07-01-87 06-30-89	Chemical Ecology of Nitidulid Beetles, Pathogenic Fungi, and their Plant Hosts
Oklahoma State Univ. Stillwater, OK 74078	J. W. Dillwith	87-CRCR-1-2377 8700679	\$45,000	08-01-87 07-31-88	Role of Plant Epicuticular Lipids in Aphid Interactions with Alfalfa
Oklahoma State Univ. Stillwater, OK 74078	R. C. Johnson	87-CRCR-1-2378 8700367	\$50,000	08-01-87 07-31-88	Molecular Adaptations for Greenbug Resistance Under Drought
Univ. of Texas Austin, TX 78712	Mary A. Rankin	87-CRCR-1-2413 8700577	\$50,000	09-01-87 08-31-88	The Cost of Migration in <u>Melanoplus sanguinipes</u>
Washington State Univ. Pullman, WA 99164	Kemet D. Spence	87-CRCR-1-2386 8700408	\$50,000	08-01-87 07-31-88	Regulation and Mode of Action of a Coagulation-initiating Insect Protein

TOTAL \$2,590,000

Biological Stress on Plants - Plant Pathology and Weeds

Research grants in this program support studies on stress on plants arising from their interactions with other plants and other microbial agents including fungi, bacteria, viruses, and mycoplasma-like organisms. The ultimate goal is to reduce losses in plant productivity from damage caused by biologically generated stresses.

Emphasis in this area is on studies that will enhance understanding of how stressful interactions are established between plants and other biological agents; how such interactions are influenced by environment and other factors inherent to the interacting organisms; how the interactions reduce plant productivity and usefulness to man; how plants react to stress generated by such interactions; and how the damage of such interactions may be reduced or eliminated.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - PLANT PATHOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Steven E. Lindow	87-CRCR-1-2542 8700740	\$75,000	09-01-87 08-31-88	Interactions of Stresses Due to Pathogens and Competition on Plant Growth
Univ. of California Davis, CA 95616	John M. Duniway	85-CRCR-1-1580 8702397	\$50,000	07-01-85 06-30-88	Influence of Environmental Stresses on the Development and Impact of Phytophthora Root Rot
Univ. of California Riverside, CA 92521	Jodie S. Holt	87-CRCR-1-2326 8700185	\$80,000	07-01-87 06-30-89	Physiological Basis for Competitive Relationships of Cotton and Perennial Weeds
Univ. of Georgia Res. Fdn. Athens, GA 30602	Timothy P. Denny	87-CRCR-1-2314 8700516	\$85,900	07-01-87 06-30-89	The Genetic Basis of Host Range Specificity in <u>Pseudomonas solanacearum</u>
Iowa State Univ. of Science & Technology Ames, IA 50011	Peter A. Peterson	87-CRCR-1-2448 8700293	\$100,000	07-15-87 07-31-90	Transposon Tagging of Agriculturally Important Disease-Resistant Genes in Maize
Iowa State Univ. of Science & Technology Ames, IA 50011	Charlotte Bronson	87-CRCR-1-2343 8700682	\$100,000	07-15-87 06-30-90	Genome Organization of the Fungal Maize Pathogen <u>Cochliobolus heterostrophus</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - PLANT PATHOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Illinois Urbana, IL 61801	Stephen K. Farrand	87-CRCR-1-2353 8700625	\$100,000	09-01-87 08-31-89	Crown Gall Control: Plasmid Engineering to Maximize Control and Minimize Failures
Univ. of Illinois Urbana, IL 61801	Constantin Rebeiz	87-CRCR-1-2342 8700130	\$100,000	07-01-87 06-30-89	Identification of Natural and Synthetic Photodynamic Herbicide Modulators
Univ. of Kentucky Res. Fdn. Lexington, KY 40506	John G. Shaw	85-CRCR-1-1536 8702535	\$45,000	07-01-85 06-30-88	Viral Gene Expression in Potyvirus Infections
Univ. of Kentucky Lexington, KY 40546	Robert J. Shepherd	86-CRCR-1-2261 8702779	\$50,000	09-15-86 09-30-88	Defining and Mapping the Genes of Cauliflower Mosaic Virus
Beltsville Area ARS, USDA Beltsville, MD 20705	Kevin J. Hackett	87-CRCR-1-2372 8700707	\$80,000	06-15-87 06-30-90	Cultivation and Detection of Mycoplasma-like Organisms

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - PLANT PATHOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Beltsville Area ARS, USDA Beltsville, MD 20705	C. Jacyn Baker	87-CRCR-1-2304 8700613	\$128,000	08-01-87 07-31-89	Molecular Mechanisms for Plant/Pathogen Recognition
Univ. of Maryland College Park, MD 20742	Alan Collmer	87-CRCR-1-2352 8700624	\$74,500	07-01-87 06-30-88	Genetics of Pectate Lyase Isozymes and Pathogenicity in <u>Erwinia chrysanthemi</u>
Michigan State Univ. East Lansing, MI 48824	M. F. Thomashow	87-CRCR-1-2366 8700620	\$100,000	09-01-87 08-31-89	Virulence Genes of <u>Agrobacterium tumefaciens</u>
Northern States Area ARS, USDA Minneapolis, MN 55401	Alan P. Roelfs	85-CRCR-1-1534 8702382	\$44,000	07/01/85 06/30/88	Genetic Diversity in Sexual and Asexual Populations of Rust Fungi in Agroecosystems
Univ. of Missouri Columbia, MO 65211	A. K. Chatterjee	87-CRCR-1-2504 8700705	\$150,000	09-15-87 09-30-89	Molecular Genetics of Extracellular Pectate Lyases of <u>Erwinia carotovora</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - PLANT PATHOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Nebraska Agric. Expt. Stn. Lincoln, NE 68583-0704	Herman W. Knoche	85-CRCR-1-1542 8702487	\$50,000	07-01-85 06-30-88	Identification of Host Components Determining Resistance of Susceptibility to Toxins
Cornell Univ. Ithaca, NY 14853	James R. Aist	87-CRCR-1-2306 8700518	\$120,000	07-01-87 06-30-89	Calcium Regulation in Secretion and Disease Resistance
Cornell Univ. Ithaca, NY 14853	William E. Fry	87-CRCR-1-2336 8700456	\$100,000	07-01-87 06-30-89	Epidemiological Impact of Sexual Recombination in <u>Phytophthora</u> <u>infestans</u>
Cornell Univ. Ithaca, NY 14853	Milton Zaitlin	87-CRCR-1-2549 8700398	\$120,000	09-01-87 08-31-89	The Association of Plant Viruses with Chloroplasts
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Laurence V. Madden	87-CRCR-1-2307 8700332	\$117,000	09-01-87 08-31-89	Rain Splash Dispersal of Fungal Pathogens of Strawberry

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOLOGICAL STRESS - PLANT PATHOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Oregon State Univ. Corvallis, OR 97331	Steven Radosevich	87-CRCR-1-2453 8700695	\$80,000	08-01-87 07-31-89	Interactions of Germination, Growth, Reproduction and Environment of Weed Communities
Utah State Univ. Logan, UT 84322	Neal K. VanAlfen	87-CRCR-1-2360 8700706	\$80,000	08-01-87 07-31-89	Identification of a Viral Gene that Regulates Fungal Virulence
Washington State Univ. Pullman, WA 99164	Timothy D. Murray	87-CRCR-1-2439 8700636	\$100,000	07-15-87 07-31-89	Effect of Soil pH on Incidence and Severity of <u>Cephalosporium</u> Stripe of Wheat
Univ. of Washington Seattle, WA 98195	Walter Halperin	87-CRCR-1-2369 8700463	\$30,000	09-15-87 09-30-88	Molecular and Genetic Studies of <u>Agrobacterium tumefaciens</u> Attachment
Univ. of Wisconsin Madison, WI 53706	Jennifer L. Parke	87-CRCR-1-2327 8700318	\$100,000	09-15-87 09-30-89	Population Dynamics of a Biological Control Agent in the Rhizosphere
Univ. of Wisconsin Madison, WI 53706	Gustaaf A. deZoeten	87-CRCR-1-2345 8700427	\$100,000	09-01-87 08-31-89	A Recombinant DNA Approach to Understanding the Pea Enation Mosaic Virus Genome

TOTAL \$2,359,400

Genetic Mechanisms for Crop Improvement

This program covers the broad area of plant genetics. The goal of the program area is to encourage quality research projects that will contribute to the increased basic understanding of biological phenomena relevant to the development of superior varieties of agricultural crops. New and innovative experimental approaches are emphasized at all levels including the molecular, biochemical, cellular and whole plant levels. The research areas that are given high priority are: (a) acquisition of basic information on the structure, function and expression of plant nuclear organellar genes, (b) development of methods for gene transfer and genetic engineering, (c) development of new methods for producing and selecting agronomically important quantitative and qualitative traits, (d) identification of plant characteristics or genes which are important targets for genetic manipulation, and (e) genetic studies on the alteration and utilization of unadapted and wild germplasm using new and novel approaches.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Peter H. Quail	87-CRCR-1-2585 8702806	\$130,000	09-01-87 08-31-88	The Phytochrome Gene: Structure, Organization and Expression
Univ. of California Davis, CA 95616	Jan Dvorak	87-CRCR-1-2278 8700503	\$135,000	06-01-87 05-31-89	Chromosome Instability Induced in Wheat by Alien Chromosomes
Univ. of California Riverside, CA 92521	Eugene Nothnagel	85-CRCR-1-1607 8700213	\$50,440	07-01-85 06-30-88	Membrane Dynamics in Regeneration and Temperature Sensitivity of Maize Genotypes
Florida State Univ. Tallahassee, FL 32306	George W. Bates	87-CRCR-1-2296 8700366	\$150,000	08-01-87 07-31-90	Limited Gene Transfer by Protoplast Fusion
South Atlantic Area ARS, USDA Athens, GA 30613	Charles W. Stuber	86-CRCR-1-2030 8702804	\$98,000	09-15-86 09-30-88	Dissection of Heterosis of Quantitative Traits Using Molecular Markers
Central Plains Area ARS, USDA Ames, IA 50010	Kendall R. Lamkey	87-CRCR-1-2370 8700738	\$100,000	09-15-87 09-30-90	Effects of Transposable Elements on Genetic Variation

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Purdue Res. Fdn.* West Lafayette, IN 47907	Stanton B. Gelvin	87-C R C R-1-2443* 8700080	\$13,000*	09-01-87 08-31-89	Use of Anti-Sense RNA to Inhibit Gene Activity in Plants
Univ. of Kentucky Research Foundation* Lexington, KY 40506	Robert J. Shepherd	87-C R C R-1-2528* 8700704	\$70,000*	09-01-87 08-31-90	Complementation among Caulimoviruses
Beltsville Area ARS, USDA Beltsville, MD 20705	Benjamin Matthews	87-C R C R-1-2284 8700602	\$121,000	09-01-87 08-31-90	Cloning and Expression of Genes Involved in Amino Acid Biosynthesis
Univ. of Missouri Columbia, MO 65211	M. G. Neuffer	87-C R C R-1-2287 8700647	\$186,370	09-01-87 08-31-91	Selection, Characterization of Genes Regulated by Light
North Carolina State Univ. Raleigh, NC 27695	William Thompson	85-C R C R-1-1910 8702801	\$90,000	09-15-86 09-30-88	Isolation and Characterization of Genes Regulated by Light
Univ. of Nebraska Lincoln, NE 68588	William A. Compton	87-C R C R-1-2359 8700558	\$72,500	08-01-87 07-31-90	Analysis of Genetic Recombination in Maize Populations Using Molecular Markers

*Both split-funded with Plant Molecular Biology research area in the amount of \$168,900 and \$80,000.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Agric. Expt. Stn. Univ. of Nebraska Lincoln, NE 68583	Paul E. Staswick	87-CRCR-1-2300 8700137	\$50,000	07-01-87 06-30-88	Structure and Expression of Soybean Leaf Storage Protein Genes
Cornell Univ. Ithaca, NY 14853	Maureen R. Hanson	87-CRCR-1-2277 8700572	\$80,690	09-01-87 08-31-88	Analysis of Proteins Associated with Cytoplasmic Male Sterility
Cornell Univ. Ithaca, NY 14853	Elizabeth D. Earle	85-CRCR-1-1608 8700594	\$206,000	09-01-85 08-31-89	Analysis and Utilization of Protoplast-derived <u>Brassica</u> Lines
Cornell Univ. Ithaca, NY 14853	J. B. Nasrallah	85-CRCR-1-1600 8700590	\$190,000	09-15-85 09-30-89	Molecular Analysis of S-locus Expression in Anthers of <u>Brassica</u>
Univ. of Wisconsin Madison, WI 53706	Paul H. Williams	87-CRCR-1-2335 8700646	\$75,000	07-01-87 06-30-89	The Identification and Characterization of Pathogens of <u>Arabidopsis thaliana</u>

TOTAL \$1,818,000

Photosynthesis

Grants in this area focus on a better understanding of photosynthesis and associated carbon metabolism. Photosynthesis is the process that crop plants use to convert solar energy into carbohydrates that plants and animals use for growth and development.

The program's aim is to cover such areas as the mechanisms of energy capture and conversion, structure, synthesis, and turnover of the photosynthetic apparatus, CO₂ fixation, photorespiration, and dark respiration. Other areas included in this program are projects on the relation of plant development to photosynthesis, including development of photosynthetic competence, translocation and partitioning of photosynthetic products; and design of whole leaf and whole plant structures best suited for photosynthetic productivity. Another area set forth for proposals is the design of new methods of genetic and cellular manipulation to improve photosynthetic efficiency in plants--including studies of the chloroplast genome, of nuclear genes regulating photosynthesis, and analysis of regulatory steps controlling both nuclear and cytoplasmic genome expression and their interactions.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Arkansas Fayetteville, AR 72701	Danny J. Davis	87-CRCR-1-2310 8700658	\$75,000	09-01-87 08-31-89	Protein-Protein Interactions in Photosynthesis
Univ. of Arizona Tucson, AZ 85721	Richard G. Jensen	87-CRCR-1-2275 8700001	\$2,000	03-01-87 08-31-87	Workshop Entitled: Ribulose 1,5-Bisphosphate Carboxylase/Oxygenase-Genes, Proteins and Regulation of Activity, April 19 - April 24, 1987
Univ. of California Davis, CA 95616	Robert W. Pearcy	85-CRCR-1-1620 8700514	\$90,000	07-01-85 06-30-89	Dynamic Responses of Photosynthesis to Variable Light
Univ. of California Davis, CA 95616	Mark A. Matthew	85-CRCR-1-1538 8700642	\$40,000	09-01-85 08-31-88	Physiological Mechanisms of Photosynthetic Acclimation to Water Deficits
U.S. Dept. of Energy San Francisco Operations Office Oakland, CA 94612	Kenneth Sauer	85-CRCR-1-1847 8700698	\$100,000	09-01-85 08-31-89	Electron Spin Echo Spectroscopy in Photosynthesis

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Iowa State Univ. of Science & Technology Ames, IA 50011	Martin H. Spalding	85-CRCR-1-1591 8700569	\$75,000	08-15-85 08-31-89	Chlamydomonas Mutants Defective in the CO ₂ -Concentrating Pathway
Purdue Res. Fdn. West Lafayette, IN 47907	Thomas L. Housley	87-CRCR-1-2438 8700397	\$81,000	07-15-87 07-31-89	Fructan Metabolism in Wheat
Kansas State Univ. Manhattan, KS 66506	James A. Guikema	87-CRCR-1-2576 8700501	\$55,000	09-15-87 09-30-88	Development of Lipid-Protein Complexes in <u>Anacystis</u> Membranes
Harvard College Cambridge, MA 02138	Lawrence Bogorad	85-CRCR-1-1584 8702808	\$60,000	09-01-85 08-31-88	Genes for Photosynthesis in Corn
Univ. of Michigan Ann Arbor, MI 48109	Vincent L. Pecoraro	87-CRCR-1-2520 8700483	\$50,000	08-15-87 08-31-88	Models for the Manganese Center in the Oxygen Evolving Complex of Photosystem II
Univ. of Michigan Ann Arbor, MI 48109	Robert R. Sharp	87-CRCR-1-2344 8700390	\$85,000	06-01-87 05-31-89	Manganese Redox Chemistry in Photosynthetic Oxygen Evolution

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Michigan State Univ. East Lansing, MI 48824	Gerald T. Babcock	87-CRCR-1-2313 8700414	\$60,000	06-01-87 05-31-88	Charge Separation and Stabilization in Chloroplast Photosystem II
Rutgers Univ. New Brunswick, NJ 08903	Barbara A. Zilinskas	87-CRCR-1-2318 8700733	\$160,000	09-01-87 08-31-90	Structure and Function of Cyanobacterial Photosynthetic Systems
Cornell Univ. Ithaca, NY 14853	Richard E. McCarty	87-CRCR-1-2442 8700562	\$100,000	09-01-87 08-31-89	The Glycolate Transporter of the Chloroplast Envelope
Cornell Univ. Ithaca, NY 14853	Roger M. Spanswick	87-CRCR-1-2397 8700570	\$81,000	07-15-87 07-31-89	Transport Mechanisms and the Control of Partitioning
Univ. of Rochester Rochester, NY 14627	Robert S. Knox	87-CRCR-1-2424 8700392	\$80,000	07-01-87 06-30-89	Time-resolved Fluorescence Studies of Excitation Energy Flow in Chloroplasts
Rensselaer Polytech. Inst. Troy, NY 12180	Harry Roy	87-CRCR-1-2334 8700055	\$85,000	06-01-87 05-31-89	Assembly of Ribulose Bisphosphate Carboxylase

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Rensselaer Polytech. Inst. Troy, NY 12180	John C. Salerno	85-CRCR-1-1586 8700513	\$80,000	07-01-85 06-30-89	Electron Transfer in the Cytochrome B6F Complex
Brookhaven National Lab. U.S. Dept. of Energy Upton, NY 11973	Geoffrey Hind	87-CRCR-1-2325 8700415	\$90,000	09-01-87 08-31-89	The Reversible Phosphorylation of Thylakoid Membrane Proteins
Brookhaven National Lab. U.S. Dept. of Energy Upton, NY 11973	John Bennett	87-CRCR-1-2441 8700544	\$120,000	09-01-87 08-31-89	Substrate Specificity of Chloroplast Protein Kinases
Agric. Expt. Stn. Oklahoma State Univ. Stillwater, OK 74078	Chang-An Yu	87-CRCR-1-2433 8700498	\$80,000	07-15-87 07-31-89	Ubiquinone Binding Sites in Bacterial Photosynthetic Apparatus
Portland State Univ. Portland, OR 97207	John H. Golbeck	87-CRCR-1-2382 8700725	\$165,000	06-15-87 06-30-90	Structure, Function and Organization of the Photosystem I Reaction Center Complex

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Gordon Research Conferences Gordon Research Center c/o Univ. of Rhode Island Kingston, RI 02881	A. M. Cruickshank	87-CRCR-1-2305 8700362	\$6,000	05-01-87 12-31-87	Travel Support for Photosynthesis Conference
Texas Tech Univ. Lubbock, TX 79409	David B. Knaff	87-CRCR-1-2333 8700050	\$60,000	09-01-87 08-31-88	Protein: Protein Complexes in Photosynthetic Electron Transfer Reactions
Univ. of Wisconsin Madison, WI 53706	Marion H. O'Leary	87-CRCR-1-2319 8700088	\$110,000	06-01-87 05-31-89	Mechanisms of Action of Phosphoenolpyruvate Carboxylase
Univ. of Wisconsin Madison, WI 53706	Stanley H. Duke	87-CRCR-1-2324 8700497	\$70,000	09-15-87 09-30-89	Chloroplast Starch Degradation

TOTAL \$2,060,000

SOYBEAN RESEARCH

The overall goal of this program area is to support long-term, basic biological research on soybeans that can generate new ideas, new knowledge, and innovative technologies which ultimately will contribute to increased productivity and quality of the soybean crop. This program encourages innovative studies on: (1) physiology, genetics, and biochemistry of soybeans, (2) the mechanisms of interactions between soybean and insect as well as microbial pests, and (3) the Rhizobium-soybean symbiosis.

Proposals on soybean research were submitted to appropriate plant science programs for review according to the scientific content of the proposal. The grants listed below were selected from those proposals deemed highly meritorious by appropriate review panels.

Additional research grants using soybean as an experimental system can be found in other plant science and biotechnology programs.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: SOYBEAN RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Louisiana State Univ. Agric. Ctr. Baton Rouge, LA 70894	Peter W. Jordan	87-CRCR-1-2346 8700435	\$100,000	07-01-87 06-30-90	Light Partitioning in a Soybean/Weed Community: Quantifying Resource Preemption
Univ. of Minnesota St. Paul, MN 55104	Mark L. Brenner	87-CRCR-1-2467 8700580	\$80,000	08-01-87 07-31-89	Role of Abscisic Acid on Sucrose Accumulation by Soybean Seeds
Univ. of Missouri* Columbia, MO 65211	Dale G. Blevins	87-CRCR-1-2466* 8701617	\$120,664*	08-01-87 07-31-89	Ureide Metabolism in Nodulated Soybeans
Univ. of Dayton Dayton, OH 45469	Donald R. Geiger	87-CRCR-1-2486 8701078	\$68,000	09-15-87 09-30-89	Carbon Partitioning of Two Soybean Cultivars under Non-Stress and Water Stress
Univ. of Wisconsin Madison, WI 53706	Douglas D. Buhler	87-CRCR-1-2367 8700579	\$98,700	07-01-87 06-30-89	Investigation of a Mechanism of Xenobiotic Detoxication by Plants

TOTAL \$467,364

*Split-funded with Nitrogen Fixation for the amount of \$5,000.

BIOTECHNOLOGY

It is widely acknowledged that biotechnological research offers direct access to new, potentially valuable high technology opportunities for agriculture and food production. Recent discoveries in molecular genetics and their successful applications show that "high technology in biology" is applicable to agriculture and food and they contribute significantly to "the molecular revolution" that is basic to many of our industries. The new biotechnological research capabilities -- particularly those that build on advances in molecular biology -- have particular advantages for agriculture. They provide a new basis for changing plant and animal productivity and performance on the basis of the directed modification of specified genes and gene systems.

This new capability offers exceptional promise, but it cannot be effective unless it is closely integrated with basic science disciplines such as genetics, biochemistry, physiology, taxonomy, ecology, and key agriculture disciplines such as plant and animal breeding, agronomy, horticulture, plant pathology, and entomology. In recognizing these needs, the overall goal of the Biotechnology Program is to support research

aimed at establishing a thorough understanding of fundamental biological processes in animals, plants, and associated microorganisms that may provide the basic scientific knowledge needed for the development and application of the new biotechnological research capability to agriculture and food.

Three research areas are emphasized: (1) molecular biology, (2) molecular and cellular mechanisms of growth and development, and (3) genetic and molecular mechanisms controlling responses to environmental and biological stress.

Biotechnology - Plant Molecular Biology

The primary objective of the sub-area, plant molecular biology, is to increase our understanding of the structure, function, regulation, and expression of genes of plant, the associated microbial systems, and the plant associated insects. This program area emphasizes the following categories of research: (1) identification, isolation, and characterization of genes and gene products, (2) relationships between gene structure and function, (3) regulatory mechanisms of gene expression, (4) interactions between nuclear and organellar genes, and between extrachromosomal and chromosomal genes, (5) mechanisms of gene recombination and transposition, (6) molecular basis of chromosomal replication, and (7) mechanisms of interaction with beneficial or deleterious microorganisms, and (8) mechanisms of interaction with beneficial or deleterious insects.

The proposals under the Biotechnology/Plant Molecular Biology area were submitted to one of the five plant science review panels according to the biological problem being addressed. The grants awarded in this program area are listed by review panels.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	Clarence I. Kado	87-CRCR-1-2282 8700314	\$200,000	07-01-87 06-30-90	Analysis of the Ros Gene
Univ. of California Los Angeles, CA 90024	Robert B. Goldberg	86-CRCR-1-2022 8702763	\$105,000	07-01-86 06-30-88	Regulation of Soybean Seed Protein Gene Expression
Univ. of Idaho Moscow, ID 83843	David J. Oliver	87-CRCR-1-2286 8700320	\$200,000	07-01-87 06-30-90	Light-Dependent Expression of Glycine Decarboxylase in Pea Leaf Mitochondria
Purdue Research* Foundation West Lafayette, IN 47907	Stanton B. Gelvin	87-CRCR-1-2443* 8700080	\$168,900*	09-01-87 08-31-89	Use of Anti-Sense RNA to Inhibit Gene Activity in Plants
Univ. of Kentucky* Research Foundation Lexington, KY 40506	Robert J. Shepherd	87-CRCR-1-2528* 8700704	\$80,000*	09-01-87 08-31-90	Complementation among Caulimoviruses

*Split-funded with Genetic Mechanisms research area.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Kentucky Lexington, KY 40506	Arthur G. Hunt	85-CRCR-1-1810 8700691	\$70,000	09-01-85 08-31-89	Gene Expression in Plants: A Study of Polyadenylation in Plants
Fedn. of American Societies for Expt. Biol. Rockville, MD 20014	Robert W. Krauss	87-CRCR-1-2280 8700004	\$4,000	06-01-87 11-30-87	FASEB Summer Research Conference on Plant Gene Expression
Michigan State Univ. East Lansing, MI 48824	Kenneth C. Sink	87-CRCR-1-2290 8700333	\$200,000	09-15-87 09-30-90	T-DNA: A Novel Marker System for Asymmetric Gene Transfer by Cell Fusion
Univ. of Minnesota St. Paul, MN 55104	Carolyn D. Silflow	85-CRCR-1-1754 8700660	\$200,000	09-15-85 09-30-89	Tubulin Genes of Plants
Washington Univ. St. Louis, MO 63130	John C. Rogers	87-CRCR-1-2299 8700423	\$150,000	08-01-87 07-31-89	Mechanisms Directing Hormonal and Developmental Regulation of Gene Expression in Barley
Univ. of New Hampshire Durham, NH 03824	Anita S. Klein	87-CRCR-1-2425 8700719	\$185,000	09-15-87 09-30-90	Tissue-specific Gene Regulation in Maize

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/GENETIC MECHANISMS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
New Mexico State Univ. Las Cruces, NM 88003	Mary A. O'Connell	87-CRCR-1-2291 8700329	\$187,000	09-01-87 08-31-90	Construction and Characterization of Somatic Hybrids and Cybrids of Tomato
Cold Spring Harbor Laboratory Cold Spring Harbor, NY 11724	John E. Boynton	87-CRCR-1-2285 8700084	\$12,000	07-01-87 06-30-88	Molecular Biology of Mitochondria and Chloroplasts Conference, August 25-30, 1987
Ohio State Univ. Res. Fdn. Columbus, OH 43212	David M. Bisaro	87-CRCR-1-2541 8702812	\$78,100	09-01-87 08-31-88	Molecular Mechanisms of Geminivirus Replication
Washington State Univ. Pullman, WA 99164-6420	Andris Kleinhofs	86-CRCR-1-2004 8702475	\$5,000	07-01-86 06-30-89	Molecular and Genetic Studies of Nitrate Reductase in Barley

TOTAL \$1,845,000

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Colorado State Univ. Fort Collins, CO 80523	Craig C. Schenck	87-CRCR-1-2358 8700685	\$90,000	08-15-87 08-31-89	Bacterial Reaction Centers
Univ. of Georgia Res. Fdn. Athens, GA 30602	Gregory W. Schmidt	87-CRCR-1-2329 8700521	\$100,000	06-01-87 05-31-89	Pigment-Protein Interactions in Light-Harvesting Complexes
Univ. of Georgia Res. Fdn. Athens, GA 30602	Joseph H. Bouton	87-CRCR-1-2408 8700394	\$90,000	07-15-87 07-31-89	Transfer and Expression of C ₄ Photosynthetic Characteristics in <u>Flaveria</u>
Univ. of Chicago Chicago, IL 60637	Robert Haselkorn	85-CRCR-1-1565 8701133	\$48,900	07-01-85 12-31-87	Molecular Genetic Analysis of the Photosynthetic Apparatus in Cyanobacteria
Univ. of Health Sciences The Chicago Medical School North Chicago, IL 60064	Frank Marcus	87-CRCR-1-2395 8700345	\$50,000	09-01-87 08-31-88	Light-regulated Enzymes of Photosynthetic Carbon Assimilation
Midwest Area, ARS, USDA Peoria, IL 61604	Donald R. Ort	87-CRCR-1-2381 8700375	\$150,000	09-01-87 08-31-90	The Physiological and Biochemical Basis for Environmental Limitations on Photosynthesis

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/PHOTOSYNTHESIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Massachusetts Inst. of Technology Cambridge, MA 02139	Douglas C. Youvan	87-CRCR-1-2328 8700295	\$100,000	06-01-87 05-31-89	Mutational Analysis of Photosynthetic Apparatus Biogenesis
Rutgers Univ. New Brunswick, NJ 08903	Carl A. Price	87-CRCR-1-2393 8700605	\$91,100	07-01-87 06-30-89	Translational Regulation in Chloroplasts
Univ. of Texas Austin, TX 78712	F. Robert Tabita	87-CRCR-1-2330 8700090	\$130,000	09-01-87 08-31-89	Bacterial Genes Coding for Plant Ribulose Bisphosphate Carboxylase

TOTAL \$850,000

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	John C. Meeks	87-CRCR-1-2446 8701623	\$105,000	08-01-87 07-31-89	Physiology and Genetics of Nitrogen Fixation by Symbiotic Cyanobacteria
Midwest Area ARS, USDA Peoria, IL 61604	Carroll P. Vance	87-CRCR-1-2588 8701336	\$96,000	09-01-87 08-31-89	Regulation of Plant-Bacterial Interactions During Legume Root Nodule Formation
Kansas State Univ. Manhattan, KS 66506	L. Clark Davis	87-CRCR-1-2447 8701292	\$72,500	07-15-87 07-31-89	Mutations Affecting the Fe Protein of <u>Klebsiella pneumoniae</u> Nitrogenase
New Mexico State Univ. Las Cruces, NM 88003	C. S.-Gopalan	87-CRCR-1-2484 8700404	\$94,000	09-01-87 08-31-89	Regulation of Host Gene Expression during Root Nodule Development in Soybean
Univ. of Texas Austin, TX 78712	Fred R. Tabita	87-CRCR-1-2427 8701340	\$105,000	08-01-87 07-31-89	Recovery of Nitrogenase from Oxygen Inactivation
Virginia Polytechnic Inst. & State Univ. Blacksburg, VA 24061	Dennis R. Dean	87-CRCR-1-2459 8701330	\$55,000	09-01-87 08-31-88	Analysis of <u>Azotobacter vinelandii</u> <u>N-fixation-specific Genes and</u> Their Products

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: BIOTECHNOLOGY - PLANT MOLECULAR BIOLOGY/NITROGEN FIXATION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Wisconsin* Madison, WI 53706	Gary P. Roberts	87-CRCR-1-2561* 8701402	\$72,378*	09-01-87 08-31-89	Analysis of a Regulatory System for Nitrogenase in <u>Rhodospirillum rubrum</u>
Marquette Univ. Milwaukee, WI 53233	Kenneth D. Noel	87-CRCR-1-2409 8701606	\$105,000	09-01-87 08-31-89	Rhizobium lipopolysaccharide: Genetics and Role in Nodule Development

TOTAL \$704,878

*Split-funded with Nitrogen Fixation research area for the amount of \$37,622.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO BIOLOGICAL STRESS (ENTOMOLOGY)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Loy E. Volkman	87-CRCR-1-2416 8700674	\$50,000	08-15-87 08-31-88	Role of Microfilaments in <u>Autographa californica NPV</u> Assembly
Univ. of Florida Gainesville, FL 32611	Harlan G. Hall	86-CRCR-1-2101 8700926	\$100,000	07-15-86 07-31-89	Genetic Characterization of Honeybees through DNA Analysis
Iowa State Univ. of Science & Technology Ames, IA 50011	R. W. Thornburg	87-CRCR-1-2518 8701110	\$111,000	09-15-87 09-30-89	Identification of Regulatory Segments in a Wound-inducible Inhibitor II Gene
North Carolina State Univ. Raleigh, NC 27695	A. C. Triantaphyllou	87-CRCR-1-2379 8700338	\$120,000	08-01-87 07-31-89	Genetics of Parasitism of the Soybean Cyst Nematode
Rutgers Univ. New Brunswick, NJ 08903	Randy Gaugler	87-CRCR-1-2298 8700306	\$90,000	07-01-87 06-30-89	Genetic Improvement and Analysis of the Entomoparasitic Nematode, <u>Steinernema Feltiae</u>
Oregon State Univ. Corvallis, OR 97331	George F. Rohrmann	87-CRCR-1-2380 8700401	\$50,000	09-01-87 08-31-88	Identification and Characterization of Baculovirus Gene Translation Products

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO BIOLOGICAL STRESS (ENTOMOLOGY)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Oregon Eugene, OR 97403	John Postlethwait	87-CRCR-1-2570 8700689	\$50,000	09-01-87 08-31-88	Molecular Genetics of Immunity in Fruit Flies
Pennsylvania State Univ. University Park, PA 16802	Ralph O. Mumma	87-CRCR-1-2423 8700357	\$90,000	07-01-87 06-30-89	Molecular, Morphological and Genetic Basis of Plant Insect Resistance
Texas A & M Res. Fdn. College Station, TX 77843	Max D. Summers	87-CRCR-1-2392 8700453	\$160,000	09-15-87 09-30-90	Integration of <i>Campoplexis</i> <i>sonorensis</i> Virus DNA in <u>Parasitoid</u> Wasp Cellular DNA
Univ. of Vermont & State Agric. College Burlington, VT 05405	George M. Happ	87-CRCR-1-2406 8700171	\$50,000	08-01-87 07-31-88	Control of Reproduction in Male Insects
Univ. of Wisconsin Madison, WI 53706	Nancy E. Beckage	87-CRCR-1-2407 8700241	\$100,000	09-01-87 08-31-89	Molecular Host-Parasite Interactions in the Tobacco Hornworm

TOTAL \$971,000

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO BIOLOGICAL STRESS (PLANT-PATH)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Thomas J. Morris	87-CRCR-1-2551 8700551	\$200,000	09-01-87 08-31-89	Molecular Structure and Function of Virus Genomes
Univ. of California Berkeley, CA 94720	Andrew O. Jackson	87-CRCR-1-2556 8700566	\$150,000	09-01-87 08-31-89	Interaction of a Satellite Virus with its Helper Virus
Univ. of California Davis, CA 95616	George Bruening	87-CRCR-1-2339 8700588	\$100,000	09-15-87 09-30-89	Antiviral Action of Satellite RNA
Univ. of California Davis, CA 95616	Tsune Kosuge	85-CRCR-1-1697 8702581	\$67,000	07-01-85 06-30-88	Control of Virulence in <u>Pseudomonas savastanoi</u>
Univ. of California Davis, CA 95616	R. W. Michelmore	87-CRCR-1-2458 8700726	\$150,000	07-15-87 07-31-89	Transformation of <u>Bremia lactucae</u> and Cloning of <u>Avirulence Genes</u>
Univ. of California Riverside, CA 92521	William O. Dawson	87-CRCR-1-2450 8700257	\$200,000	07-15-87 07-31-89	Sequence-Function Relationship of the TMV-Host Interaction

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO BIOLOGICAL STRESS (PLANT-PATH)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	John J. Harada	86-CRCR-1-2172 8702769	\$50,000	09-15-86 09-30-88	Molecular Aspects of Disease in Higher Plants
Salk Inst. for Biological Studies San Diego, CA 92138	Christopher J. Lamb	87-CRCR-1-2350 8700690	\$100,000	07-01-87 06-30-89	Gene Activation Mechanisms in the Initiation of Plant Defense Responses
Univ. of Kentucky Res. Fdn. Lexington, KY 40506	C. L. Schardl	87-CRCR-1-2391 8700711	\$100,000	07-01-87 06-30-89	Molecular Studies of Phytoalexin Detoxification and Virulence in <u>Fusarium</u>
Washington Univ. St. Louis, MO 63130	Roger N. Beachy	86-CRCR-1-2262 8702819	\$50,000	09-15-86 09-30-88	Site-Specific Modifications of TMV-Coat Protein and Its Cross- Protection
State Univ. of New York Albany, NY 12201	Jeremy A. Bruenn	87-CRCR-1-2368 8700041	\$100,000	09-01-87 08-31-89	Cloning and Expression of the <u>Ustilago maydis</u> Virus Toxin Gene
Cornell Univ. Ithaca, NY 14853	O. C. Yoder	87-CRCR-1-2557 8700614	\$50,000	09-15-87 09-30-88	Molecular Analysis of the Tox 1 Gene of <u>Cochliobolus</u> <u>heterostrophus</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO BIOLOGICAL STRESS (PLANT-PATH)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Cornell Univ. Ithaca, NY 14853	Hans D. VanEtten	87-CRCR-1-2510 8700517	\$53,000	08-01-87 07-31-88	Do Pathogens of the Same Host Require Common Pathogenicity Traits?
Rockefeller Univ. New York, NY 10021	Hugh D. Robertson	87-CRCR-1-2340 8700697	\$100,000	07-01-87 06-30-89	Viroid Multiplication and Disease Induction
Clemson Univ. Clemson, SC 29634	H. D. Skipper	87-CRCR-1-2341 8700606	\$50,000	07-01-87 06-30-88	Loss of Herbicidal Efficacy by Microbial-mediated Processes
Univ. of Wisconsin Madison, WI 53706	Albert H. Ellingboe	87-CRCR-1-2451 8700291	\$100,000	07-15-87 07-31-89	Molecular Tagging of the <u>Rp 1f</u> Gene in Maize

TOTAL \$1,620,000

Biotechnology - Response to Physical Stress on Plants

This program supports research on the various physico-chemical factors (such as heat, cold, drought, etc.) which prevent the expression of the full genetic potential of a plant. The major goals are to understand the molecular basis for the response to the various stresses and to identify which genetic systems causing these responses can be manipulated by biotechnology techniques.

The program emphasizes: the identification, transfer, and expression of genes involved in the stress response or are likely to affect performance under stress; fundamental mechanisms of the stress response including injury, tolerance and avoidance of stress at the molecular, cellular, and organismal level; mechanisms of the coordination of organismal response to stress; and laboratory and field investigations leading to an understanding of the causes, consequences, and avoidance of stress.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO PHYSICAL STRESS (PLANTS)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Arizona Tucson, AZ 85721	Hans J. Bohnert	87-C R C R-1-2475 8701148	\$222,000	08-01-87 07-31-90	Regulation of Gene Expression During C A M-Induction
Univ. of California Davis, C A 95616	Andre E. Lauchli	87-C R C R-1-2462 8700985	\$110,000	08-01-87 07-31-89	Disturbed Ion Compartmentation in Leaf Meristems: Site Inhibition by Salt
Univ. of Georgia Res. Fdn. Athens, G A 30602	Judith N. Strommer	87-C R C R-1-2500 8701000	\$96,000	08-01-87 07-31-89	Mutagenic Analysis of Anaerobic Induction in Plants
Univ. of Illinois Champaign, IL 61820	John M. Cheeseman	87-C R C R-1-2501 8701120	\$125,000	09-01-87 08-31-89	Potassium Circulation and Salinity Responses in Sunflower
Purdue Res. Fdn. West Lafayette, IN 47907	L. N. Csonka	87-C R C R-1-2495 8701195	\$101,000	09-01-87 08-31-89	Analysis of Proline Biosynthesis and Its Role in Osmoregulation
Univ. of Maine Orono, ME 04469	Michael E. Vayda	87-C R C R-1-2580 8700996	\$90,000	09-01-87 08-31-89	Molecular Response of Potato Tubers to Anaerobic Stress
Michigan State Univ. East Lansing, MI 48824	C. R. Somerville	87-C R C R-1-2507 8700994	\$86,000	09-01-87 08-31-89	The Molecular Basis for Chilling Sensitivity in a Mutant of <u>Arabidopsis</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO PHYSICAL STRESS (PLANTS)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Michigan State Univ. East Lansing, MI 48824	Andrew D. Hanson	87-C R C R-1-2460 8700720	\$67,000	07-15-87 07-31-88	Molecular Basis and Function of Stress-Induced Betaine Synthesis in Plants
Univ. of Minnesota St. Paul, MN 55104	John V. Carter	85-C R C R-1-1666 8700995	\$126,000	09-15-85 09-30-89	Role of Microtubules in Freezing Injury and Cold Acclimation in Plants
Univ. of Missouri Columbia, MO 65211	Robert E. Sharp	87-C R C R-1-2492 8701098	\$118,000	08-01-87 07-31-89	Mechanisms Determining Root and Shoot Growth in Water Stressed Plants
Univ. of Nebraska Lincoln, NE 68588	Philip M. Kelley	87-C R C R-1-2509 8701124	\$108,000	08-01-87 07-31-89	The Regulation of the Anaerobic Genes of Maize
Univ. of Nevada Reno, NV 89557	Jeffrey R. Seemann	87-C R C R-1-2470 8701020	\$205,000	09-01-87 08-31-90	Environmental Stress Effects on Photosynthetic Carbon Metabolism
Ohio State Univ. Res. Fdn. Columbus, OH 43210-1194	Robert A. Kennedy	87-C R C R-1-2508 8701087	\$169,000	08-01-87 07-31-89	Anaerobic Metabolism in <u>Echinochloa crus-galli</u> (Barnyard Grass) Seeds

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: BIOTECHNOLOGY - RESPONSE TO PHYSICAL STRESS (PLANTS)

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Washington Seattle, WA 98195	Barbara Smit-Spinks	87-CRCR-1-2493 8701018	\$86,000	09-01-87 08-31-89	Cellular Basis for Limitations of Leaf Growth by Root Stress
Univ. of Wisconsin Madison, WI 53706	Jiwan P. Palta	85-CRCR-1-1673 8701044	\$84,000	09-01-85 08-31-89	Mechanism of Freezing Stress Resistance and Cold Acclimation in Plants

TOTAL \$1,793,000

Biotechnology - Plant Growth and Development

The lack of information about the basic cellular and molecular processes involved in plant growth and development is considered a serious limiting step for realizing the full potential of biotechnology in agriculture. The goal of this program is to support fundamental research designed to fill in this gap in our knowledge. The program encourages the use of emerging experimental techniques and emphasizes: (1) cellular and molecular mechanisms controlling plant growth and development and (2) metabolic processes related to growth and development.

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Robert L. Fischer	87-CRCR-1-2526 8701297	\$102,590	08-15-87 08-31-89	Polygalacturonase: Enzyme Function and Gene Regulation During Fruit Ripening
Univ. of California Berkeley, CA 94720	Bob B. Buchanan	85-CRCR-1-1664 8701295	\$110,000	08-01-85 07-31-89	Developmental Studies on Thioredoxin Systems in Plants
Univ. of California Davis, CA 95616	Alan B. Bennett	87-CRCR-1-2525 8702805	\$97,410	08-15-87 08-31-89	Polygalacturonase: Enzyme Function and Gene Regulation During Fruit Ripening
Univ. of California Davis, CA 95616	Roy M. Sachs	87-CRCR-1-2420 8701080	\$170,000	09-01-87 08-31-90	Molecular Analysis of the Photoperiodic Control of Flower Induction
Univ. of California Davis, CA 95616	Shang Fa Yang	87-CRCR-1-2419 8701101	\$110,000	08-01-87 07-31-89	In-Vivo Affinity Labeling and Characterization of the Ethylene Receptor

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
San Jose State Univ. Foundation San Jose, CA 95192-0139	Daniel B. Walker	87-CRCR-1-2455 8701054	\$120,000	08-01-87 07-31-89	Mechanism of Plant Epidermal Development
Yale Univ. New Haven, CT 06520	Timothy M. Nelson	87-CRCR-1-2411 8700973	\$126,000	07-15-87 07-31-89	Analysis of Genes Determining Sex of Maize Inflorescences
Yale Univ. New Haven, CT 06520	Ian M. Sussex	87-CRCR-1-2435 8701008	\$230,000	09-15-87 09-30-90	Molecular and Cellular Analysis of Branch Initiation in Pea
Univ. of Florida Gainesville, FL 32611	G. A. Moore	85-CRCR-1-1623 8701127	\$120,000	08-01-85 07-31-89	Genetic Transformation of <u>Citrus</u> to Facilitate Hybrid Production
Univ. of South Florida Tampa, FL 33620	Mary J. Saunders	87-CRCR-1-2399 8701001	\$124,000	09-01-87 08-31-89	Spatial and Temporal Control of Plant Cell Division
Iowa State Univ. of Science & Technology Ames, IA 50011	R. C. Coolbaugh	87-CRCR-1-2400 8701069	\$70,000	07-15-87 07-31-89	Abscisic Acid Biosynthesis in Cell-Free Extracts from <u>Cercospora rosicola</u>

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Chicago Chicago, IL 60637	Laurens J. Mets	87-CRCR-1-2351 8701301	\$90,000	06-15-87 06-30-88	Genetic Control of Cellular Differentiation in Leaves of a C ₄ Plant
Univ. of Chicago Chicago, IL 60637	Gayle Lamppa	87-CRCR-1-2469 8701037	\$150,000	09-01-87 08-31-89	The Role of Precursor Processing Enzymes in Chloroplast Biogenesis
Purdue Res. Fdn. West Lafayette, IN 47907	Brian A. Larkins	87-CRCR-1-2356 8701176	\$86,000	09-01-87 08-31-88	Analysis of Seed Globulin Gene Expression in Oats and Other Cereals
Beltsville Agric. Res. Ctr. ARS, USDA Beltsville, MD 20705	Jerry D. Cohen	85-CRCR-1-1718 8701057	\$112,000	08-01-85 09-30-89	Auxin-Containing Peptides from <u>Phaseolus</u> Seeds
American Society for Cell Biology Bethesda, MD 20814	R. D. Rodewald	87-CRCR-1-2347 8702745	\$3,000	06-01-87 12-31-87	Acidic Intracellular Compartments in Plant and Animal Cells

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Michigan Ann Arbor, MI 48109	Eugene E. Dekker	87-CRCR-1-2563 8701109	\$117,000	09-01-87 08-31-89	Enzymes of 4-Methylene Glutamic Acid Metabolism in Germinating Legumes
Carleton College Northfield, MN 55057	Susan R. Singer	87-CRCR-1-2554 8701294	\$145,000	09-01-87 08-31-90	Acquisition of Competence for Floral Determination
Univ. of Minnesota St. Paul, MN 55104	Susan M. Wick	87-CRCR-1-2530 8701052	\$125,000	09-01-87 08-31-89	Location, Behavior and Composition of Microtubule Initiation Sites in Plants
Univ. of Minnesota St. Paul, MN 55104	B. G. Gengenbach	87-CRCR-1-2364 8701093	\$116,000	07-01-87 06-30-89	Amyloplast Differentiation in Developing Maize Endosperm
St. Mary's College Winona, MN 55987	Richard V. Kowles	87-CRCR-1-2365 8701067	\$90,000	09-01-87 05-31-90	Temporal and Positional Gene Expression in the Development of Maize Endosperm
Univ. of North Carolina Chapel Hill, NC 27514	Alan M. Jones	87-CRCR-1-2402 8701028	\$210,000	07-01-87 06-30-90	Phytochrome-Regulated Growth in Maize

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Rutgers Univ. New Brunswick, NJ 08903	Bruce P. Wasserman	87-CRCR-1-2414 8700961	\$149,000	09-15-87 09-30-89	Molecular Aspects of B-Glucan Biosynthesis in Higher Plants
Cornell Univ. Ithaca, NY 14853	D. J. Paolillo, Jr.	87-CRCR-1-2401 8701077	\$80,000	08-01-87 07-31-89	An Evaluation of GA Action on Cell Elongation Using Norin 10 Dwarfing Genes
Cornell Univ. Ithaca, NY 14853	Martha A. Mutschler	87-CRCR-1-2436 8701115	\$100,000	09-01-87 08-31-89	Molecular Analysis of the Effects of the <u>alc</u> Mutant in Tomato Ripening
City Univ. of New York Res. Fdn. Baruch College New York, NY 10010	Edward B. Tucker	87-CRCR-1-2444 8701122	\$100,000	07-15-87 07-31-89	Regulation of Plant Cell-to-Cell Communication
Case Western Reserve Univ. Cleveland, OH 44106	Christopher D. Town	87-CRCR-1-2559 8701103	\$106,000	09-01-87 08-31-89	Auxin Metabolism in Arabidopsis: A Genetic Approach
Oregon State Univ. Corvallis, OR 97331	Carol J. Rivin	85-CRCR-1-1644 8701117	\$125,000	09-15-85 09-30-89	Molecular Analysis of Embryo Development in Wildtype and Vp Mutants in Maize

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Pennsylvania State Univ. University Park, PA 16802	Jack C. Shannon	87-CRCR-1-2279 8701100	\$3,000	05-01-87 10-31-87	Financial Support for Second Pennsylvania State University Symposium in Plant Physiology
Gordon Research Conferences Gordon Research Center c/o Univ. of Rhode Island Kingston, RI 02881	Keith A. Walker	87-CRCR-1-2349 8701033	\$6,000	06-01-87 09-30-87	Plant Cell and Tissue Culture (Conference)
Brown Univ. Providence, RI 02912	Annette W. Coleman	87-CRCR-1-2534 8701086	\$64,000	09-01-87 08-31-89	Detection and Analysis of Organelle DNA Changes During Pollen Development
Univ. of Tennessee Knoxville, TN 37996	Donald K. Dougall	87-CRCR-1-2535 8700972	\$60,290	09-01-87 08-31-88	Metabolic Basis of Reversible Changes in Chemical Production by Cells
Univ. of Texas Austin, TX 78713	John W. La Claire	87-CRCR-1-2545 8701023	\$96,000	09-01-87 08-31-89	Organization, Function and Dynamics of the Plant Cytoskeleton

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - PLANT GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Wisconsin Madison, WI 53706	Michael R. Sussman	87-CRCR-1-2357 8701024	\$130,000	07-01-87 06-30-90	Calcium-Activated Plasma Membrane Protein Kinase

TOTAL \$3,643,290

Biotechnology - Animal Molecular Biology

The objective of the animal molecular biology program is to increase our knowledge and understanding of the structure, function, regulation and expression of genomes of animal, microbial and viral origin. This includes but is not limited to: the molecular biology of genes of cellular, organellar or animal origin; gene transfer and germline integration of exogenous genes; the molecular biology of replication and gene expression of bacteria, parasites, viruses and other infectious or non-infectious agents; structural immunology and immunogenetics; molecular genetics; and molecular endocrinology. Priorities are given to those studies that will yield fundamental information which may ultimately aid in improving the biological efficiency and disease resistance in domestic animals.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL MOLECULAR BIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
La Jolla Biological Laboratories San Diego, CA 92138-9216	Thomas R. Gingeras	87-CRCR-1-2560 8701403	\$135,000	09-01-87 08-31-89	Establishment of DNA Virus-resistant Bovine Cell Lines
Univ. of California San Francisco, CA 94143	Charles P. Ordahl	87-CRCR-1-2404 8701862	\$260,000	09-15-87 09-30-90	Retroviral Transduction of Muscle-Specific Promoter Cassettes in Chick Embryos
Stanford Univ. Stanford, CA 94305	Gary K. Schoolnik	87-CRCR-1-2403 8701644	\$140,000	09-01-87 08-31-88	<u>Moraxella bovis</u> Pili. Molecular and Genetic Studies
Midwest Area USDA, ARS Peoria, IL 61604	Robert F. Silva	85-CRCR-1-1709 8701532	\$85,000	09-01-85 08-31-89	Genetic Engineering of Avian Herpesviruses: Potential Use as Live Recombinant DNA Vaccines
Univ. of Illinois Urbana, IL 61801	Harris A. Lewin	87-CRCR-1-2546 8701469	\$110,000	09-01-87 08-31-89	Molecular Analysis of the Bovine Major Histocompatibility Complex
Indiana Univ. Foundation Bloomington, IN 47402	Chao-Hung Lee	87-CRCR-1-2456 8701861	\$182,000	09-01-87 08-31-90	<u>Escherichia coli</u> Enterotoxin STII

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL MOLECULAR BIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Amherst College Amherst, MA 01002	Richard A. Goldsby	87-CRCR-1-2432 8701346	\$180,000	08-01-87 07-31-90	Immunomodulation by Monoclonal Anti-Ids to Pathogen-reactive Mono- and Polyclonal Ids
Bionetics Research, Inc. Kensington, MD 20895	Stephen H. Hughes	87-CRCR-1-2584 8701863	\$95,000	09-15-87 09-30-90	Design and Testing of Retroviral Vectors for the Creation of Transgenic Poultry
Michigan State Univ. East Lansing, MI 48824	Donald W. Salter	87-CRCR-1-2445 8701536	\$253,000	09-15-87 09-30-90	Gene Insertion into the Avian Germ Line Using Retroviral Vectors
Northern States Area, ARS, USDA Minneapolis, MN 55401	Eugene J. Smith	87-CRCR-1-2389 8701483	\$135,000	09-01-87 08-31-90	Analysis of the Sex-linked Endogenous Virus-slow Feathering Complex of Chickens
Molecular Genetics, Inc. Minnetonka, MN 55343	Marc S. Collett	87-CRCR-1-2555 8700979	\$75,000	09-15-87 09-30-88	Immunogenicity of Isolated Bovine Viral Diarrhea Virus Proteins
Univ. of Missouri Columbia, MO 65211	Kim S. Wise	87-CRCR-1-2564 8701663	\$200,000	09-15-87 09-30-90	Immunologic and Molecular Genetic Determinants in Mycoplasmal Pneumonia of Swine

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL MOLECULAR BIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
North Carolina State Univ. Raleigh, NC 27695-7003	T. R. Klaenhammer	87-CRCR-1-2547 8701584	\$190,000	09-01-87 08-31-90	Molecular Characterization of pTR2030-directed Phage Resistance in Lactic Streptococci
Agric. Expt. Station Univ. of Nebraska Lincoln, NE 68583-0704	Daniel L. Rock	87-CRCR-1-2415 8701328	\$120,000	09-01-87 08-31-89	Molecular Characterization of Pseudorabies Virus (PRV) Latency-Related Genes
Univ. of Nevada Reno, NV 89557	Stuart T. Nichol	87-CRCR-1-2428 8701487	\$205,000	09-01-87 08-31-90	A Molecular Approach to Vesicular Stomatitis Epizootiology, Disease Diagnosis & Control
Cornell Univ. Ithaca, NY 14853	Carl A. Batt	87-CRCR-1-2405 8701467	\$124,000	08-01-87 07-31-89	Inhibition of <u>Streptococcus lactis</u> Bacteriophage by Antisense mRNA
Cornell Univ. Ithaca, NY 14853	Gary M. Dunny	87-CRCR-1-2421 8701486	\$170,000	09-01-87 08-31-90	Biochemistry and Genetics of Bacteriophage Resistance in Dairy Streptococci
Univ. of Cincinnati Cincinnati, OH 45221	Jeffrey Robbins	85-CRCR-1-1729 8701209	\$200,000	09-01-85 08-31-89	Structure and Function of the Major Muscle Protein, Myosin, in Poultry

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL MOLECULAR BIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Gordon Research Conferences Gordon Research Center c/o Univ. of Rhode Island Kingston, RI 02881-0801	Barry G. Hall	87-CRCR-1-2390 8700070	\$4,000	08-01-87 07-31-88	Population Biology of Microorganisms and Their Accessory Elements
Texas A & M Res. Fdn. College Station, TX 77843	James E. Womack	87-CRCR-1-2437 8701679	\$142,000	09-01-87 08-31-90	Molecular and Somatic Cell Genetics: Mapping the Cattle Genome
Univ. of Washington Seattle, WA 98195	Stephen L. Moseley	87-CRCR-1-2426 8701561	\$220,000	09-01-87 09-30-90	Genetic Organization and Function in the Production of F41 Bacterial Adhesin
Univ. of Wisconsin Madison WI 53706	G. J. Letchworth, III	87-CRCR-1-2548 8701476	\$100,000	09-01-87 08-31-89	Antibody Inhibition of Viral Protein Interaction with Mucosal Epithelial Cells
Univ. of Wisconsin Madison, WI 53706	Richard F. Marsh	87-CRCR-1-2457 8701643	\$200,000	09-01-87 08-31-90	Characterization of Scrapie Agent Nucleic Acid

TOTAL \$3,525,000

Biotechnology - Animal Growth and Development

Research in animal growth and development contributes to a basic understanding of potential problems related to suboptimal growth and development in animals of domestic agricultural significance. The program emphasizes molecular and cellular biological approaches in a number of research areas including but not limited to: growth hormones, growth factors and other macromolecules which regulate muscle and skeletal growth; the transfer of exogenous genes to the germline of domestic animals and their subsequent expression, mammary gland biogenesis and development; the regulation of gene expression as it relates to developmental processes; the role of hormones and immune factors in mediating immunologic and physiologic stress; and the developmental consequences of embryo transfer. Special attention is given to innovative projects of "high risk."

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: BIOTECHNOLOGY - ANIMAL GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Alabama Birmingham, AL 35294	Johanna A. Griffin	87-CRCR-1-2317 8700064	\$300,000	08-01-87 07-31-90	Molecular Genetic Regulation of the Immune Response in Chickens
Univ. of Arizona Tucson, AZ 85721	Darrel E. Goll	87-CRCR-1-2283 8700403	\$100,000	09-01-87 08-31-88	Proteases Responsible for Muscle Protein Degradation and Their Role in Growth
Univ. of California Davis, CA 95616	Ursula K. Abbott	87-CRCR-1-2301 8700237	\$217,500	06-01-87 05-31-90	Developmental Analysis of the Avian Germ Line
Northern Plains Area ARS, USDA Fort Collins, CO 80526	Joan H. Eisemann	87-CRCR-1-2587 8700282	\$139,000	09-15-87 09-30-90	Mechanisms of Interorgan Metabolism During Growth
Wesleyan Univ. Middletown, CT 06457	Lewis N. Lukens	87-CRCR-1-2483 8700202	\$150,000	08-01-87 07-31-90	Regulation of Collagen Genes During Changes in Chondrocyte Differentiation

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Florida Gainesville, FL 32611	Dov Borovsky	87-CRCR-1-2394 8700083	\$91,000	09-01-87 08-31-90	Role of Peptide Hormones in Invertebrate Reproduction
Iowa State Univ. of Science & Technology Ames, IA 50011	Carol M. Warner	87-CRCR-1-2388 8700146	\$5,000	09-01-87 08-31-88	Research Symposium: Molecular Biology of the MHC of Domestic Animal Species
Univ. of Illinois Champaign, IL 61820	Bryan A. White	87-CRCR-1-2281 8700018	\$250,000	07-01-87 06-30-90	Enzymatic and Genetic Analysis of Ruminococcus Cellulases
Univ. of Illinois Urbana, IL 61801	Harris A. Lewin	87-CRCR-1-2292 8700165	\$125,000	06-01-87 05-31-90	Detection of Major Genes for Growth Using Genetic Markers
Kansas State Univ. Manhattan, KS 66506	Frank Blecha	87-CRCR-1-2309 8700217	\$239,500	07-01-87 06-30-90	Immunomodulation and Stress Hormone Interactions in Bovine Lymphocytes
Michigan State Univ. East Lansing, MI 48824	H. Allen Tucker	87-CRCR-1-2302 8700191	\$280,000	08-01-87 07-31-90	Photoperiodic Regulation of Hypothalamic and Pituitary Cells

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Minnesota St. Paul, MN 55104	William R. Dayton	87-CRCR-1-2531 8700036	\$120,000	09-01-87 08-31-90	Purification of a Porcine-Serum-Borne Inhibitor of Muscle Cell Proliferation
North Carolina State Univ. Raleigh, NC 27695	Ruth M. Shuman	87-CRCR-1-2276 8700193	\$300,000	07-01-87 06-30-90	Gene Transfer and Tissue-Specific Expression in Avian Species
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Timothy G. Ramsay	87-CRCR-1-2533 8700147	\$120,000	09-15-87 09-30-90	Regulation of Porcine Preadipocyte Growth and Use for Clone Production
Ohio State Univ. Res. Fdn. Columbus, OH 43212	F. A. Simmen	87-CRCR-1-2532 8700058	\$135,000	08-01-87 07-31-90	Porcine IgG Receptors in Developing and Lactating Mammary Gland
Pennsylvania State Univ. University Park, PA 16802	C. R. Baumrucker	85-CRCR-1-1881 8700262	\$130,000	09-15-85 09-30-89	IGF ₁ Stimulation of Bovine Mammary Tissue Growth
Univ. of Texas Medical Branch Galveston, TX 77550	David A. Konkel	87-CRCR-1-2354 8700215	\$110,500	07-01-87 06-30-89	A New ras Oncogene-related Gene Family - Structure, Function and Regulation

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: BIOTECHNOLOGY - ANIMAL GROWTH & DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Wisconsin Madison, WI 53706	Neal L. First	87-CRCR-1-2303 8700174	\$142,500	09-15-87 09-30-90	Ontogeny and Control of Development of Bovine Preimplantation Embryos
Univ. of Wisconsin Madison, WI 53706	C. J. Czuprynski	87-CRCR-1-2308 8700040	\$120,000	07-01-87 06-30-90	Molecular Events in Interferon and Interleukin-1 Stimulated Bovine Neutrophils

TOTAL \$3,075,000

ANIMAL SCIENCE

The emphasis in this research program is to improve reproductive efficiency in domestic farm animals. Research is supported in all possible problem areas: puberty, ovulation, corpus luteum formation and function, sperm physiology, insemination, fertilization, prenatal death, and poor survival of offspring.

Brucellosis

The Brucellosis program supports research at the molecular, cellular, and genetic levels that: define the mechanisms by which Brucella abortus induces disease in cattle and persists as an infectious agent; defines the basis of the bovine immune response with B. abortus that results in protective immunity; through molecular techniques identifies and produces immunogens to stimulate long-lived protective immunity in cattle; identifies and produces antigens to differentiate among non-infected, vaccinated and B. abortus - infected cattle.

Reproductive Physiology

This sub-program area supports innovative research in the following categories: (a) Mechanisms affecting embryo survival, endocrinological control of embryo development, mechanisms of embryo-maternal interactions, and embryo implantation; (b) gamete physiology, primarily gametogenesis including maturation processes, follicle growth, ovulation, corpus luteum formation and function and superovulation; fundamental processes of fertilization mechanisms regulating gamete survival in vivo and in vitro, and basic questions regarding gamete transport and (c) fundamental questions addressing parturition, postpartum interval to conception and neonatal survival.

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: ANIMAL SCIENCE - BRUCELLOSIS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Scripps Clinic & Res. Fdn. 10666 N. Torrey Pines Rd. La Jolla, CA 92037	Fred Heffron	87-CRCR-1-2468 8701475	\$310,300	08-01-87 07-31-90	Transposon Mutagenesis in <u>Brucella abortus</u> to Identify New Virulence Genes
Cornell Univ. Ithaca, NY 14853	Alexander J. Winter	85-CRCR-1-1859 8701473	\$140,000	09-15-85 09-30-89	Immunity in Brucellosis: Comparative Response to Virulent and Attenuated Strains

TOTAL \$450,300

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL SCIENCE - REPRODUCTIVE EFFICIENCY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California San Francisco, CA 94143	Dennis Kiyoshi Fujii	87-CRCR-1-2544 8701145	\$150,000	09-01-87 08-31-90	Bovine Uterine Epithelium; Growth and Hormonal Responses
Colorado State Univ. Fort Collins, CO 80523	G. D. Niswender	87-CRCR-1-2523 8701261	\$100,000	09-01-87 08-31-89	Role of Conceptal Proteins and Prostaglandins During Early Pregnancy in Ewes
Univ. of Connecticut Storrs, CT 06268	Robert A. Milvae	87-CRCR-1-2539 8701231	\$125,000	09-01-87 08-31-90	Follicular Granulosa Cell Contributions to Bovine Corpus Luteum Function
Univ. of Idaho Moscow, ID 83843	R. Garth Sasser	87-CRCR-1-2521 8701259	\$100,000	09-15-87 09-30-89	The Role of Pregnancy-specific Protein B in Pregnancy Recognition
Univ. of Illinois Champaign, IL 61820	James E. Hixon	87-CRCR-1-2537 8701230	\$150,000	09-01-87 08-31-90	The Role of Oxytocin and its Uterine Receptor in Luteolysis
Univ. of Illinois Urbana, IL 61801	O. David Sherwood	87-CRCR-1-2578 8700970	\$150,000	09-01-87 08-31-90	Determination of the Effect of Relaxin on the Cervix in Pregnant Pigs

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL SCIENCE - REPRODUCTIVE EFFICIENCY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Purdue Res. Fdn. West Lafayette, IN 47907	Patricia Y. Hester	87-CRCR-1-2515 8700962	\$64,396	09-15-87 09-30-89	The Role of Prostaglandins in the Premature Oviposition of Chicken Eggs
Purdue Res. Fdn. West Lafayette, IN 47907	P. V. Malven	87-CRCR-1-2538 8701280	\$140,000	09-01-87 08-31-90	Progesterone-induced Mechanisms Inhibitory to LH Secretion
Univ. of Kentucky Res. Fdn. Lexington, KY 40546	Keith K. Schillo	87-CRCR-1-2567 8701191	\$90,000	09-01-87 08-31-89	Effects of Lipid Metabolism on Luteinizing Hormone Release in Prepubertal Lambs
Univ. of Michigan Ann Arbor, MI 48109	Douglas L. Foster	87-CRCR-1-2550 8701281	\$150,000	09-01-87 08-31-90	Modulation of Gonadotropins and the Timing of Puberty by Nutrition and Growth
Univ. of Minnesota St. Paul, MN 55104	J. E. Wheaton	87-CRCR-1-2540 8701136	\$100,000	09-01-87 08-31-89	Ovine Inhibin Fragments as Immunogens to Increase Fertility
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Wayne L. Bacon	87-CRCR-1-2568 8701153	\$80,000	09-15-87 09-30-89	Yolk Precursor Metabolism in Turkey Hens Differing in Growth Rate and Reproductive Efficiency

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL SCIENCE - REPRODUCTIVE EFFICIENCY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Oregon State Univ. Corvallis, OR 97331	Alfred R. Menino	87-C R C R-1-2536 8701255	\$150,000	09-01-87 08-31-90	Is Plasminogen Involved in the Hatching of Livestock Embryos?
Vanderbilt Univ. Nashville, TN 37240	David L. Garbers	87-C R C R-1-2569 8701254	\$102,000	09-15-87 09-30-89	Signal/Transduction Mechanisms in Bovine Spermatozoa
Southern Plains Area USDA, ARS College Station, TX 77840	Michael T. Zavy	87-C R C R-1-2502 8701271	\$150,000	09-01-87 08-31-89	Endometrial Cell Biology as Influenced by the Conceptus or Progesterone Treatment
Texas A & M Res. Fdn. College Station, TX 77843	G. L. Williams	87-C R C R-1-2496 8701188	\$152,000	09-01-87 08-31-90	Mammary Somatosensory Signalling and Postpartum Anestrus in Suckled Cows
Texas A & M Res. Fdn. College Station, TX 77843	W. R. Klemm	87-C R C R-1-2579 8701288	\$150,000	09-01-87 08-31-89	Estrous-specific Compounds and Pheromone in Cervico-vaginal Mucus
Washington State Univ. Pullman, WA 99164	H. H. Westberg	87-C R C R-1-2522 8701270	\$150,000	09-15-87 09-30-89	Determination of Reproductive Pheromones in the Cow

TOTAL \$2,253,396

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL SCIENCE - REPRODUCTIVE PHYSIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	Wallis H. Clark	87-CRCR-1-2514 8701200	\$120,000	09-15-87 09-30-89	Attainment of Competency in the Sperm of the Marine Shrimp, <u>Sicyonia Ingentis</u>
South Atlantic Area ARS, USDA Athens, GA 30613	James S. Kesner	87-CRCR-1-2519 8701273	\$47,796	09-15-87 09-30-88	Studies on the Neuroendocrine Control of Gonadotropin Secretion in the Gilt
Univ. of Missouri Columbia, MO 65211	R. Michael Roberts	87-CRCR-1-2543 8701316	\$200,000	09-15-87 09-30-90	Structure, Function and Hormonal Control of Synthesis of Porcine Uterine Proteins
Agric. Expt. Stn. North Dakota State Univ. Fargo, ND 58105	Dale A. Redmer	87-CRCR-1-2573 8701207	\$180,000	09-01-87 08-31-90	Role of Angiogenic Factors in Ovarian Function
Rutgers Univ. New Brunswick, NJ 08903	Juan-Pablo Advis	87-CRCR-1-2558 8701175	\$180,000	09-15-87 09-30-90	Neuroendocrine Control of Ovulation in the Domestic Hen

COMPETITIVE RESEARCH GRANTS PROGRAM
 PROGRAM AREA: ANIMAL SCIENCE - REPRODUCTIVE PHYSIOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
The Population Council, Inc. New York, NY 10017	David M. Phillips	87-CRCR-1-2583 8701171	\$200,000	09-01-87 08-31-90	Cell Biology of the Cumulus Oophorus
Univ. of Cincinnati Cincinnati, OH 45221	William J. Larsen	87-CRCR-1-2574 8701180	\$200,000	09-01-87 08-31-90	Factors Enhancing Cumulus Expansion: Effect on <u>In Vitro</u> Fertilization
Univ. of Wisconsin Madison, WI 53706	B. C. Wentworth	87-CRCR-1-2529 8701219	\$100,000	09-01-87 08-31-89	The Recessive White Quail Embryo as the Surrogate Host for Wild-type Quail Primordial Germ Cells
Univ. of Wisconsin Madison, WI 53706	Roy L. Ax	85-CRCR-1-1864 8701329	\$125,000	09-15-85 09-30-89	Characteristics of Glycosaminoglycan Binding Sites in Ovarian Follicles of Cows

TOTAL \$1,352,796

ALCOHOL FUELS RESEARCH

This program supports research activities related to the physiological, microbiological, biochemical, and genetic processes controlling the biological conversion of agriculturally important biomass material to alcohol fuels and industrial hydrocarbons. Studies on factors which limit efficiency of biological production of alcohol fuels and means of overcoming these limitations are also encouraged.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: ALCOHOL FUELS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Purdue Res. Fdn. West Lafayette, IN 47907	Michael R. Ladisch	87-CRCR-1-2454 8701284	\$76,000	09-01-87 08-31-89	Fermentable Sugars from Cellulose Treated with Water and Intercalating Agents
Purdue Res. Fdn. West Lafayette, IN 47907	Nancy W.Y. Ho	85-CRCR-1-1713 8701286	\$96,228	09-01-85 08-31-89	Improvement of Yeast Alcohol Fermentation Via Genetic Engineering
Univ. of Massachusetts Amherst, MA 01003	E. Canale-Parola	87-CRCR-1-2398 8701214	\$97,491	09-01-87 08-31-89	Cellulases and Hemicellulases of Ethanol-producing Mesophilic Bacteria
North Carolina State Univ. Raleigh, NC 27695-7003	Leo W. Parks	85-CRCR-1-1634 8701147	\$100,553	08-01-85 07-31-89	Cell Membrane Technology in the Fermentative Production of Alcohol
Lehigh Univ. Bethlehem, PA 18015	B. S. Montenecourt	87-CRCR-1-2387 8701161	\$117,000	09-01-87 08-31-89	Isolation and Cloning of the (R)-Lactyl-CoA Dehydratase Gene from <u>Megasphaera elsdenii</u>

TOTAL \$487,272

INSECT PEST SCIENCE

Before successful strategies for managing insect pests can be developed, a strong basic insect biology research effort is needed. The Insect Pest Science Program provided \$901,548 each for basic studies on boll weevil/bollworm, pine bark beetle, and gypsy moth. This program area supports research on behavioral physiology; chemical ecology; insect-host interaction; endocrinology; population dynamics; behavioral ecology; and insect pathogens, parasites, and predators.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - BOLL WEEVIL/BOLL WORM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Arizona Tucson, AZ 85721	William S. Bowers	87-CRCR-1-2489 8702272	\$150,000	09-15-87 09-30-90	Storage Protein Mediated Deposition and Release of Inhibitors in Bollworm Fatbody
Univ. of California Riverside, CA 92521	Thomas C. Baker	87-CRCR-1-2577 8702280	\$150,000	09-01-87 08-31-90	Flight Control in <u>Heliothis virescens</u> and <u>Heliothis zea</u>
South Atlantic Area ARS, USDA Athens, GA 30613	P. D. Greany	87-CRCR-1-2479 8702167	\$100,000	09-15-87 09-30-89	Chemical Mediation of Oviposition and Egg Development by a Bollworm Endoparasite
South Atlantic Area ARS, USDA Athens, GA 30613	Peter E. Teal	87-CRCR-1-2490 8702164	\$100,000	08-01-87 07-31-90	Genetics and Biosynthesis of Sex Pheromone Blends by <u>Heliothis</u> Species
Univ. of Missouri Columbia, MO 65211	Thomas R. Yonke	87-CRCR-1-2463 8702179	\$8,000	08-01-87 07-31-88	Genetics of Maize Insects: An Invitation by the Hungarian Academy of Sciences

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - BOLL WEEVIL/BOLL WORM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Mid-South Area ARS, USDA Stoneville, MS 38776	K. R. Hopper	87-CRCR-1-2473 8702251	\$100,000	09-15-87 09-30-90	Host Plant Attractance and Within-Habitat Search Rate of <u>Heliothis</u> parasitoids
North Carolina State Univ. Raleigh, NC 27695	George G. Kennedy	87-CRCR-1-2505 8701265	\$100,000	09-01-87 08-31-90	Effects of Hornworm Resistance in Tomato on Natural Enemies of <u>Heliothis zea</u>
Clemson Univ. Clemson, SC 29634	David G. Heckel	87-CRCR-1-2506 8702153	\$93,548	08-01-87 07-31-89	Basic and Applied Genetic Linkage Mapping in <u>Heliothis virescens</u>
Texas A & M Res. Fdn. College Station, TX 77843	Roger W. Meola	87-CRCR-1-2474 8702224	\$100,000	09-01-87 08-31-89	Characterization and Isolation of the <u>Heliothis Zea</u> Diapause Termination Factor

TOTAL \$901,548

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - GYPSY MOTH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Illinois Champaign, IL 61820	Michael R. Jeffords	87-CRCR-1-2516 8702071	\$150,000	09-15-87 09-30-90	European Microsporidia as Biological Control Agents of the Gypsy Moth
Univ. of Massachusetts Amherst, MA 01003	Joseph S. Elkinton	87-CRCR-1-2498 8702146	\$100,000	09-01-87 08-31-89	Spatial Analysis of Gypsy Moth Density and Mortality
Univ. of Massachusetts Amherst, MA 01003	David E. Leonard	87-CRCR-1-2497 8702265	\$20,000	09-01-87 08-31-88	Gypsy Moth Storage Proteins as Indices of Nutritive Quality in Field Populations
Univ. of Maryland College Park, MD 20742	Richard B. Imberski	87-CRCR-1-2562 8701645	\$50,000	09-01-87 08-31-88	Reproductive Physiology of Gypsy Moths: Mechanism of Light- induced Sterility
Oregon State Univ. Corvallis, OR 97331	R. E. Berry	87-CRCR-1-2478 8702064	\$251,824	09-01-87 08-31-90	Regulation of Development and Detoxication in Gypsy Moth <u>Lymantria dispar</u> (L.)
Northeastern Forest Experiment Station Forest Service, USDA Broomall, PA 19008	William E. Wallner	87-CRCR-1-2524 8702168	\$15,000	09-01-87 08-31-88	Conference Grant: Comparison of Features of New and Old World Tussock Moths (Lymantriidae)

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - GYPSY MOTH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
North Atlantic Area ARS, USDA Philadelphia, PA 19118	Richard S. Soper	87-CRCR-1-2503 8701944	\$100,000	09-01-87 08-31-89	Epizootiology of <i>Entomophaga maimaiga</i> , a Fungal Pathogen of the Gypsy Moth
Temple Univ. Philadelphia, PA 19122	M. G. Wolfersberger	87-CRCR-1-2487 8701968	\$100,000	09-01-87 08-31-89	Selection of Optimal <i>Bacillus thuringiensis</i> Strain for Gypsy Moth Control
Univ. of Vermont Burlington, VT 05405	George M. Happ	87-CRCR-1-2488 8701969	\$54,724	09-01-87 08-31-88	Control of Reproduction of Male Gypsy Moths
Univ. of Wisconsin Madison, WI 53706	William R. Engels	87-CRCR-1-2517 8701523	\$60,000	09-01-87 08-31-89	Baculovirus-mediated Transformation of Insects

TOTAL \$901,548

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - PINE BARK BEETLE

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Donald L. Dahlsten	87-CRCR-1-2480 8701961	\$90,000	09-01-87 08-31-89	Host Specificity of <i>Ips</i> spp. Parasitoids in Three California <u>Pinus</u> Species
Univ. of Florida Gainesville, FL 32611	James L. Nation	87-CRCR-1-2491 8702177	\$160,000	09-01-87 08-31-90	Chemical Ecology of Host Colonization by the Black Turpentine Beetle
Univ. of Georgia Research Foundation, Inc. Athens, GA 30602	C. Wayne Berisford	87-CRCR-1-2494 8702286	\$103,117	09-01-87 08-31-89	Evaluation of Behavioral Chemicals for Suppression of Southern Pine Beetle
North Central Experiment Station FS, USDA St. Paul, MN 55108	R. A. Haack	87-CRCR-1-2481 8702150	\$50,000	09-01-87 08-31-88	Impact of Ultrasonic Acoustics on the Colonization Behavior of a Pine Bark Beetle
North Carolina State Univ. Raleigh, NC 27695	Fred P. Hain	85-CRCR-1-1860 8702217	\$160,000	09-15-85 09-30-89	Host Resistance of Southern Yellow Pines to Bark Beetle Attack

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: INSECT PEST SCIENCE - PINE BARK BEETLE

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Cornell Univ. Ithaca, NY 14853	Charles F. Aquadro	87-CRCR-1-2482 8702160	\$100,000	09-01-87 08-31-89	Genetic Divergence in the Pine Weevils
Brigham Young Univ. Provo, UT 84602	Stephen L. Wood	87-CRCR-1-2582 8701484	\$88,431	09-01-87 08-31-90	A World Catalog of Scolytidae and Platypodidae (Coleoptera)
Univ. of Washington Seattle, WA 98195	Robert I. Gara	87-CRCR-1-2499 8701173	\$150,000	09-01-87 08-31-90	Effect of Fungal Pathogens of Lodgepole Pine on Mountain Pine Beetle Activity

TOTAL \$901,548

HUMAN REQUIREMENTS FOR NUTRIENTS

The emphasis in this program area is on determining human requirements for nutrients. Support is not provided for clinical research or for demonstration or action projects.

Research in human nutrition contributes to improving human nutritional status by increasing our understanding of requirements for nutrients in relation to different patterns of food intake. Findings help fill the gaps of our knowledge related to nutrient requirements, bioavailability, the interrelationships of nutrients, and the nutritional value of foods consumed in the United States as they relate to these requirements. Special attention in this program area is given to the study of trace constituents of foods and their effect on human health.

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	Quinton R. Rogers	87-CRCR-1-2418 8700288	\$70,000	07-15-87 07-31-88	Neural Responses to Disproportionate Amino Acid Diets: Role of Monoamines
Univ. of California Davis, CA 95616	Kathryn G. Dewey	86-CRCR-1-1968 8702277	\$72,400	06-01-86 05-31-89	Nutrient Intake and Growth of Breast-Fed Infants, 3-18 Months
Univ. of California Davis, CA 95616	Bo Lonnerdal	87-CRCR-1-2572 8700289	\$40,000	09-01-87 08-31-88	Manganese Absorption in Humans
Univ. of Colorado Health Sciences Center Denver, CO 80262	K. M. Hambidge	87-CRCR-1-2337 8700402	\$160,996	09-15-87 09-30-90	Psychocognitive Effects of Mild Zinc Deficiency in Infants
Univ. of Florida Gainesville, FL 32611	Peggy L. Borum	87-CRCR-1-2465 8700231	\$42,000	09-01-87 08-31-88	Is Carnitine an Essential Nutrient for the Newborn?
Iowa State Univ. of Science & Technology Ames, IA 50011	James A. Olson	87-CRCR-1-2320 8700019	\$270,000	07-01-87 06-30-90	Evaluation of the Status and Requirements of Humans for Vitamin A

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Iowa Iowa City, IA 52242	Donald M. Mock	87-CRCR-1-2331 8700310	\$50,000	07-01-87 06-30-88	Biotin in Human Milk
Purdue Research Foundation West Lafayette, IN 47907	S. Suzanne Nielsen	85-CRCR-1-1621 8700177	\$40,000	09-15-85 09-30-88	Resistance of Legume Proteins to Proteolysis: Role of Heat-Stable Proteinase Inhibitors
Louisiana State Univ. & A & M College Baton Rouge, LA 70803	Daniel H. Hwang	87-CRCR-1-2513 8700136	\$60,000	09-15-87 09-30-89	Effects of Different Types of Dietary w3 Fatty Acids on Eicosanoid Synthesis
Univ. of Massachusetts Amherst, MA 01003	John J. Cunningham	87-CRCR-1-2565 8700251	\$50,000	09-15-87 09-30-88	Vitamin C Status in Healthy Women: A Stable Isotope Approach
Boston Univ. Boston, MA 02118	Steven H. Zeisel	87-CRCR-1-2464 8700132	\$56,000	09-01-87 08-31-89	Choline Deficiency in Humans - Effects on Muscle Function
Massachusetts Inst. of Technology Cambridge, MA 02139	George Wolf	87-CRCR-1-2321 8700312	\$260,000	09-01-87 08-31-90	Biochemical Reasons for the Requirement of Vitamin A in the Mammalian Organism

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Massachusetts Inst. of Technology Cambridge, MA 02139	Vernon R. Young	87-CRCR-1-2566 8700059	\$51,000	09-15-87 09-30-88	Methionine Kinetics in Relation to Methionine Requirements in Man
Johns Hopkins Univ. Baltimore, MD 21218	Tomas R. Guilarte	87-CRCR-1-2527 8700102	\$40,000	09-01-87 08-31-88	Maternal Vitamin B-6 Nutrition: Effects on the Dopaminergic System of Progeny
Michigan State Univ. East Lansing, MI 48824	Maija H. Zile	87-CRCR-1-2449 8700223	\$110,000	08-01-87 07-31-89	Metabolism and Function of Retinoic Acid in the Small Intestine
Univ. of Missouri Columbia, MO 65211	Gretchen M. Hill	87-CRCR-1-2575 8700230	\$51,000	09-15-87 09-30-89	Estimation of Daily Copper Intake
State Univ. of New York Albany, NY 12201	Joseph L. Napoli	87-CRCR-1-2332 8700046	\$65,000	09-01-87 08-31-88	Dietary Carotenoids and the Concentrations of Vitamin A in Tissues
Cornell Univ. Ithaca, NY 14853	Dennis D. Miller	87-CRCR-1-2315 8700238	\$70,000	07-01-87 06-30-89	Calcium Bioavailability in Dairy Foods: Validation and Application of a Method

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Cornell Univ. Ithaca, NY 14853	Daphne A. Roe	87-CRCR-1-2338 8700129	\$50,000	09-01-87 08-31-88	Photodegradation of Carotenoids in Vivo: Assessment of Role of Photosensitizers
Monell Chemical Senses Center 3500 Market Street Philadelphia, PA 19104	Michael G. Tordoff	87-CRCR-1-2316 8700176	\$86,000	09-01-87 08-31-89	Nonnutritive Sweeteners and Food Intake in Man
Medical College of Pennsylvania Philadelphia, PA 19129	A. Catharine Ross	86-CRCR-1-1980 8702767	\$70,000	07-01-86 06-30-88	Vitamin A and Immunity
Univ. of Texas Austin, TX 78712	J. Freeland-Graves	87-CRCR-1-2312 8700116	\$80,000	08-01-87 07-31-89	Requirements of Manganese in Women
Agric. Expt. Stn. Virginia Polytechnic Inst. & State Univ. Blacksburg, VA 24061	George E. Bunce	86-CRCR-1-1946 8702762	\$30,000	07-01-86 06-30-88	Interaction of Zinc and Vitamin B ₆ in Estrogen-directed Gene Expression

COMPETITIVE RESEARCH GRANTS PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Virginia Commonwealth Univ. Richmond, VA 23298	Gregory S. Heard	85-CRCR-1-1592 8700221	\$50,000	09-01-85 08-31-89	Bioavailability and Requirements of Biotin for Infants and Children
Univ. of Wisconsin Madison, WI 53706	William H. Karasov	87-CRCR-1-2311 8700186	\$60,000	07-01-87 06-30-89	Nutritional Modulation of Intestinal Vitamin Transport
Univ. of Wisconsin Madison, WI 53706	Janet L. Greger	87-CRCR-1-2323 8700100	\$80,000	07-01-87 06-30-89	Chloride, Calcium and Sodium Interactions
Univ. of Wisconsin Madison, WI 53706	John W. Suttie	87-CRCR-1-2322 8700145	\$189,000	09-15-87 09-30-89	Human Phylloquinone Requirement

TOTAL \$2,253,396

FOREST AND RANGELAND RENEWABLE RESOURCES PROGRAM

This program is divided into the two program areas as described below.

Wood Utilization

Improved wood utilization practices depend upon a continually advancing scientific foundation of basic research in wood properties and fundamental components of wood science. This program area supports research that addresses critical barriers to improved wood utilization and that will provide the scientific base from which new research and development can proceed. The major areas of focus include: (1) wood chemistry and biochemistry, (2) physical and mechanical properties of wood and basic processing technology, (3) structural wood engineering, and (4) harvesting and forest engineering with emphasis on the impact of harvesting upon forest productivity, quality and quantity of harvest, or other aspects of wood utilization. Innovative approaches to solving fundamental problems in the field of wood science and technology are encouraged.

Forest Biology:

Forest Biology emphasizes two areas: (1) Genetic structure and function, which is aimed at utilizing variations and adaptations that exist in gene pools of existing populations. Research focus is on development of knowledge of woody plant genomes, identification of valuable genes, elucidation of controls of genetic expression, as well as basic research necessary for development of genetic engineering techniques, including regeneration of whole plants from cell and tissue culture. (2) Mechanisms of interactions in forest systems, the objectives of which are to gain a basic understanding of the forces that influence forest ecosystems, especially their development and productivity. Research is needed in this area to increase knowledge of the mechanisms driving synergistic processes and those involved in antagonistic relationships of forest organisms.

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Auburn Univ. Auburn Univ., AL 36849-4201	R. J. Mitchell	87-FSTY-9-0268 8701670	\$38,349	09-01-87 08-31-88	Vacuolar Isolation from Pine Needles - A Method for Cytochemical Investigations
Pacific Southwest Forest & Range Expt. Stn. Berkeley, CA 94701	W. J. Otrosina	87-FSTY-9-0236 8701954	\$210,000	08-15-87 08-31-90	Relationships of Host Specificity and Pathogenicity to Intersterility in <u>Heterobasidion annosum</u>
Pacific Southwest Forest & Range Expt. Stn. Berkeley, CA 94701	D. B. Neale	87-FSTY-9-0239 8701957	\$115,010	09-01-87 08-31-89	Mechanisms of Inheritance and Transmission of Conifer Organelle Genomes
Colorado State Univ. Fort Collins, CO 80523	F. W. Smith	87-FSTY-9-0265 8701652	\$170,100	09-15-87 09-30-90	The Influence of Canopy Architecture on Stand Productivity and Production Efficiency
Univ. of Georgia Res. Fdn. Athens, GA 30602	Scott A. Merkle	87-FSTY-9-0249 8701658	\$220,000	09-01-87 08-31-90	Engineering Heavy Metal Resistance in Yellow-Poplar via DNA Transformation
Univ. of Idaho Moscow, ID 83843	R. L. Crawford	87-FSTY-9-0255 8701303	\$244,000	09-01-87 08-31-90	Mechanisms of Brown-Rot Wood Decay: Lignin Degradation

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Illinois Urbana, IL 61801	Evan H. DeLucia	87-FSTY-9-0261 8702077	\$171,790	09-01-87 08-31-90	Limitations of Photosynthesis by Soil Temperature in Subalpine Conifers
Univ. of Illinois Urbana, IL 61801	J. M. Cheeseman	87-FSTY-9-0269 8702239	\$168,800	09-15-87 09-30-90	Carbon and Phosphorus Metabolisms of Anaerobically- grown Loblolly and Pond Pine Seedlings
Southern Forest Experiment Station New Orleans, LA 70113	R. W. Hemingway	87-FSTY-9-0273 8701354	\$179,328	09-01-87 08-31-90	Condensed Tannins as Substitutes for Resorcinol in Bonding of Cord to Rubber
Univ. of Maine Orono, ME 04469	M. S. Greenwood	87-FSTY-9-0237 8701986	\$220,233	09-15-87 09-30-90	Gene Expression During Maturation in Conifers in Relation to Application of Biotechnology
Michigan Technological Univ. Houghton, MI 49931	W. M. Bulleit	87-FSTY-9-0240 8701302	\$42,600	09-01-87 08-31-88	Lifetime Reliability of Wood Structural Systems
Michigan Technological Univ. Houghton, MI 49931	V. L. Chiang	87-FSTY-9-0278 8701556	\$163,702	09-15-87 09-30-90	In Vivo Modification of Lignin Biosynthesis in Softwood

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Michigan Technological Univ. Houghton, MI 49931	S. M. Shaler	87-FSTY-9-0252 8701567	\$96,000	09-15-87 09-30-89	Improving Performance of Wood Composites Through Reduction of Pressing Induced Stresses
Michigan Technological Univ. Houghton, MI 49931	B. A. Haataja	87-FSTY-9-0274 8701427	\$110,010	09-15-87 09-30-89	Mat Deformation Response in Molding Wood Composites
USDA, Forest Service Experiment Station St. Paul, MN 55108	W. J. Mattson	87-FSTY-9-0270 8702148	\$80,992	09-01-87 08-31-90	Effects of Multiple Stresses on Paper Birch Resistance to Gypsy Moth and Bronze Birch Borer
North Dakota State Univ. Agricultural Expt. Stn Fargo, ND 58105	G. A. Tuskan	87-FSTY-9-0267 8702184	\$182,700	09-15-87 09-30-90	Complementary In Vitro Studies of Western Gait Rust Resistance In Ponderosa Pine
Univ. of New York Albany, NY 12201	Kenneth Hammel	87-FSTY-9-0259 8701569	\$139,032	09-01-87 08-31-90	Lignin-Degrading Enzymes from Lower Soil Fungi

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Cornell Univ. Ithaca, NY 14853	T. J. Fahey	87-FSTY-9-0264 8702075	\$279,486	09-01-87 08-31-91	Response of Pin Cherry-Northern Hardwood Stands to Changes in Resource Availability
Univ. of New York Albany, NY 12201	S. W. Tanenbaum	87-FSTY-9-0275 8701508	\$180,000	09-15-87 09-30-90	Biomass Conversion to Industrial Polysaccharides
Univ. of Akron Akron, OH 44325	W. L. Mattice	87-FSTY-9-0256 8701355	\$156,033	09-01-87 08-31-90	Complexes of Proanthocyanidin Polymers with Polypeptides
Oregon State Univ. Corvallis, OR 97331	J. J. Morrell	87-FSTY-9-0276 8701320	\$140,000	09-15-87 09-30-89	Integrated Control of Wood Decay Fungi
Oregon State Univ. Corvallis, OR 97331	C. C. Brunner	87-FSTY-9-0277 8701432	\$142,000	09-15-87 09-30-89	Spectral Reflectance of Wood Surface Features
Oregon State Univ. Corvallis, OR 97331	J. W. Funck	87-FSTY-9-0247 8701406	\$100,000	09-15-87 09-30-89	Measuring Surface Roughness on Dry Veneer Using Stereo Disparity Imaging

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Puerto Rico Rio Piedras, PR 00931	Ned Fetcher	87-FSTY-9-0238 8701971	\$164,472	09-15-87 09-30-90	Photoinhibition in Tropical Trees
Clemson Univ. Clemson, SC 29634	D. D. Hook	87-FSTY-9-0271 8702159	\$158,500	09-01-87 08-31-90	The Physiological Bases of Genetic Variation in Loblolly Pine Waterlogging Tolerance
Univ. of Tennessee Agri. Expt. Station Knoxville, TN 37901	S. E. Schlarbaum	87-FSTY-9-0272 8702233	\$38,349	09-01-87 02-28-89	Initiation of Somatic Cell Genetic Research in Forest Trees
Utah State Univ. Logan, UT 84322-1415	N. K. Van Alfen	87-FSTY-9-0243 8702180	\$304,905	09-01-87 08-31-90	Regulation of Virulence of <u>Endothia parasitica</u>
Virginia Polytechnic Institute & State Univ. Blacksburg, VA 24061	W. G. Glasser	87-FSTY-9-0250 8701415	\$66,000	09-01-87 08-31-89	Fiber Reinforced Composites Using a Lignin-Based Matrix
Virginia Polytechnic Institute & State Univ. Blacksburg, VA 24061	D. A. Dillard	87-FSTY-9-0253 8701397	\$113,700	09-01-87 08-31-90	Integrated Hydrothermal Viscoelastic Processing in Pressing Wood Composition

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Virginia Polytechnic Institute & State Univ. Blacksburg, VA 24061	Christen Skaar	87-FSTY-9-0260 8701400	\$72,000	09-01-87 08-31-89	Non-Isothermal Coupled Heat and Moisture Transfer Through Wood
Virginia Polytechnic Institute & State Univ. Blacksburg, VA 24061	S. A. Sinclair	87-FSTY-9-0257 8701401	\$61,000	09-01-87 02-29-90	Causal Design for Technological Innovation in the Wood Furniture Industry
Weyerhaeuser Company Tacoma, WA 98477	N. C. Wheeler	87-FSTY-9-0266 8702086	\$36,620	09-15-87 09-30-89	Genetic Analysis of Differential Reproductive Success in Douglas-Fir
Weyerhaeuser Company Tacoma, WA 98477	Roger Timmis	87-FSTY-9-0263 8702227	\$132,800	09-15-87 09-30-89	Natural Variation and Role of Alternative Respiration in Douglas-fir
Univ. of Washington Seattle, WA 98195	Jay A. Johnson	87-FSTY-9-0262 8701465	\$122,354	09-01-87 08-31-90	Fiber Composite Fastener System for Wood Members: A Feasibility Study
Univ. of Washington Seattle, WA 98195	W. T. McKean	87-FSTY-9-0245 8701488	\$106,018	09-15-87 09-30-90	Pulping Liquor Transport

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Washington Seattle, WA 98195	S. C. Iverson	87-FSTY-9-0251 8701531	\$133,000	08-15-87 08-31-90	Investigation of the Monocable System for Cable Yarding of Small, Low-Value Trees
Washington State Univ. Pullman, WA 99164	Ovid A. Plumb	87-FSTY-9-0244 8701538	\$120,000	09-01-87 08-31-89	Heat and Mass Transport in Wood-drying
USDA, Forest Service Madison, WI 53705-2398	Carol L. Link	87-FSTY-9-0254 8701334	\$33,003	09-15-87 09-30-89	Mathematical Modeling for Early Determination of Wood Preservative Effectiveness
USDA, Forest Service Madison, WI 53705-2398	W. T. Simpson	87-FSTY-9-0246 8701335	\$14,720	09-15-87 09-30-90	Sensitivity of Moisture Movement Models to Equilibrium Moisture Content Errors
USDA, Forest Service Madison, WI 53705-2398	J. C. Ward	87-FSTY-9-0241 8701345	\$70,000	09-01-87 08-31-89	Relation of Wood Quality to Drying Problems with Bacterially Infected Oak
USDA, Forest Service Madison, WI 53705-2398	J. E. Winandy	87-FSTY-9-0283 8701880	\$100,000	09-15-87 09-30-90	Influence of Incising on the Treatability and Strength of Refractory Species

FOREST & RANGELAND RENEWABLE RESOURCES PROGRAM

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Wisconsin Madison, WI 53706	K. F. Raffa	87-FSTY-9-0235 8701949	\$150,894	09-01-87 04-30-90	Physiological Responses of Conifers to Sawfly Attack
Univ. of Wisconsin Madison, WI 53706	F. J. Worzala	87-FSTY-9-0258 8701369	\$139,500	09-01-87 08-31-90	Improved Wood Utilization Through Saw Material Development

TOTAL \$5,688,000

SPECIAL RESEARCH GRANTS PROGRAM

The objective of this grant program is to carry out research to facilitate or expand promising breakthroughs in areas of food and agricultural sciences of importance to the Nation. Two major areas of research were funded under this program during Fiscal Year 1987:

Animal Health Research	\$5,408,340
Aquaculture Research	270,180
TOTAL	\$5,678,520

This program is administered under the authority of Section 2(c) (1) of P.L. 89-106, as amended. Eligible institutions include land-grant colleges and universities, State agricultural experiment stations, and all colleges and universities having a demonstrable capacity in food and agricultural research.

A brief description of each of the two areas of research in the Special Research Grants Program follows with a listing of research grants awarded in each for FY 1987.

Animal Health

Overall, this research is to develop and/or refine biological and chemical methods to suppress animal losses from infectious and noninfectious diseases and internal and external parasites. The research is directed toward clarifying infectious and noninfectious diseases and parasites and their interactive effects on animal health; and to develop practical and implementable

management systems for the producer to prevent or alleviate these causes of animal losses.

Research includes clarification of complex or unknown etiologies, development or improvement of diagnostic methodologies, clarification of disease pathogenesis and methods of transmission, studies of resistance mechanisms and resistance-enhancing factors and development of disease prevention, control or eradication technologies.

Research is centered on highest priority animal health problems of beef and dairy cattle, swine, poultry, sheep and goats, horses and aquaculture species as identified by the Animal Health Science Research Advisory Board. This includes studies on major causes of disease losses in beef and dairy cattle production such as the respiratory disease complex, reproductive diseases including brucellosis and anestrus, enteric and digestive diseases, mastitis, bluetongue, parasites and metabolic diseases. Research on swine centers on health hazards such as enteric, reproductive and respiratory diseases, and other major problems such as pseudorabies and trichinosis. Poultry disease studies include respiratory diseases, skeletal problems, enteric, neoplastic and immunologic disorders. Sheep research includes diseases such as food rot, respiratory diseases, parasites and bluetongue. Equine health research centers on respiratory, enteric and reproductive diseases and musculo-skeletal disorders. Research on diseases in aquaculture species also is included.

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Arizona Tucson, AZ 85721	Lynn A. Joens	87-CRSR-2-3094 8702018	\$145,374	08-01-87 07-31-90	Porcine Proliferative Entertis: A Synergistic Disease
Univ. of Arizona Tucson, AZ 85721	J. Glenn Songer	87-CRSR-2-3118 8701574	\$90,375	09-15-87 09-30-89	Role of Phospholipase D in Pathogenesis of <u>Corynebacterium pseudotuberculosis</u> Infection
Univ. of California Davis, CA 95616	Richard Yamamoto	87-CRSR-2-3101 8702141	\$108,794	07-01-87 06-30-89	Species and Strain-specific Recombinant DNA Probes for <u>Mycoplasma gallisepticum</u>
Univ. of California Davis, CA 95616	Mark C. Thurmond	87-CRSR-2-3097 8701788	\$84,087	07-01-87 06-30-89	Humoral Recognition of Gram Negative Core Antigens in Neonatal Calves
Univ. of California Davis, CA 95616	James S. Cullor	87-CRSR-2-3095 8701779	\$123,451	07-01-87 06-30-89	Bovine Defensins: Natural Antibiotics Against Mastitis Pathogens
Univ. of California Davis, CA 95616	Bennie I. Osburn	87-CRSR-2-3096 8701784	\$148,082	07-01-87 06-30-89	Modulatory Effects of Cimetidine on the Bovine Immune System and <u>Salmonella</u> Carrier State

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Davis, CA 95616	Bradford P. Smith	87-CRSR-2-3175 8701781	\$110,935	08-01-87 07-31-89	Milk ELISA to Detect <u>Salmonella dublin</u> Carrier Cows
Univ. of California-San Diego La Jolla, CA 92093	Lynette B. Corbeil	87-CRSR-2-3077 8701726	\$150,000	09-01-87 08-31-90	Haemophilus somnus Reproductive Infections: Diagnosis and Immunity
Colorado State Univ. Fort Collins, CO 80523	Daniel H. Gould	87-CRSR-2-3208 8701826	\$134,955	09-15-87 09-30-89	Dietary Factors Governing the Expression of Polio- encephalomalacia in Cattle
Univ. of Georgia Res. Fdn. Athens, GA 30602	Vicki S. Blazer	87-CRSR-2-3040 8701592	\$28,167*	07-01-87 06-30-89	Dietary Lipid and Disease Resistance in Channel Catfish
Univ. of Georgia Res. Fdn. Athens, GA 30602	William L. Ragland	87-CRSR-2-3119 8702119	\$41,874	07-01-87 06-30-90	Immunomodulation of Chickens with Nonionic Block Polymers
Univ. of Georgia Res. Fdn. Athens, GA 30602	Debra D. Morris	87-CRSR-2-3144 8701900	\$57,984	07-01-87 06-30-89	Endotoxemia in Equine Colic; Therapy Using a Platelet Activating Factor - Receptor Antagonist

*Split-funded with Aquaculture Research for a total amount of \$47,810.

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Iowa State Univ. of Science & Technology Ames, IA 50011	Charles O. Thoen	87-C RSR-2-3146 8701787	\$111,300	07-01-87 06-30-89	Johne's Disease: Production of Antigens for Use in Diagnostic Tests
Iowa State Univ. of Science & Technology Ames, IA 50011	Prem S. Paul	87-C RSR-2-3209 8702093	\$103,869	09-15-87 09-30-90	Characterization of Immunogens in Transmissible Gastroenteritis Virus of Swine
Iowa State Univ. of Science & Technology Ames, IA 50011	Kenneth B. Platt	87-C RSR-2-3103 8702090	\$96,457	07-01-87 06-30-89	Pseudorabies Detection in Vaccinated Pigs by Antidiotypic Monoclonal Antibodies
Iowa State Univ. of Science & Technology Ames, IA 50011	James A. Roth	87-C RSR-2-3120 8701746	\$149,459	07-01-87 06-30-89	Immunosuppression and Immunomodulation in BVD Virus Infection
Univ. of Illinois Champaign, IL 61820	Deoki N. Tripathy	87-C RSR-2-3102 8701590	\$141,961	09-01-87 08-31-89	Molecular Markers of Laryngotracheitis Viruses of Variable Respiratory Virulence
Univ. of Illinois Urbana, IL 61801	J. A. Shaddock	87-C RSR-2-3099 8702027	\$148,034	09-01-87 08-31-90	Porcine Pulmonary Injury Due to Neutrophils

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Purdue Res. Fdn. West Lafayette, IN 47907	Judith N. Nielsen	87-CRSR-2-3145 8702011	\$149,854	07-01-87 06-30-90	Development of a DNA Probe for Diagnosis of Leptospiral Infection
Kansas State Univ. Manhattan, KS 66506	Bradley W. Fenwick	87-CRSR-2-3121 8702099	\$127,818	09-15-87 09-30-89	Development of a Subunit Vaccine for <u>Haemophilus pleuropneumoniae</u>
Kansas State Univ. Manhattan, KS 66506	Harish C. Minocha	87-CRSR-2-3195 8701761	\$89,418	08-15-87 08-31-90	Anti-Idiotypes of Bovine Respiratory Disease Viruses: Vaccine Feasibility Studies
Univ. of Missouri Columbia, MO 65211	Carl A. Pinkert	87-CRSR-2-3147 8702034	\$137,954	09-01-87 08-31-89	Infectious Disease Resistance in Transgenic Pigs: A Pilot Project
Montana State Univ. Bozeman, MT 59717	C. A. Speer	87-CRSR-2-3148 8701939	\$135,418	09-15-87 09-30-90	Characterization of Functional Epitopes Against Bovine Coccidiosis
Agric. Res. Div. Univ. of Nebraska Lincoln, NE 68583-0704	Gary A. Anderson	87-CRSR-2-3156 8701743	\$96,175	09-01-87 08-31-89	Bovine Respiratory Syncytial Virus: Subunit Vaccine, Immunity, and Rapid Diagnosis

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Cornell Univ. Ithaca, NY 14853	Francis A. Kallfelz	87-CRSR-2-3122 8701689	\$144,142	07-01-87 06-30-89	Vitamin D Metabolites in Bovine Parturient Hypocalcemia
Cornell Univ. Ithaca, NY 14853	Alexander J. Winter	87-CRSR-2-3078 8701703	\$128,495	07-01-87 06-30-90	A Simple Assay for Screening Efficacy of <u>Brucella abortus</u> Vaccines in Cattle
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Y. M. Saif	87-CRSR-2-3104 8702105	\$147,983	07-01-87 06-30-90	Monoclonal Antibodies and Viral Proteins of Infectious Bursal Disease Virus
Ohio State Univ. Res. Fdn. Columbus, OH 43212	Yasuko Rikihisa	87-CRSR-2-3196 8701915	\$104,266	09-15-87 09-30-89	Development of a Vaccine for Potomac Horse Fever
Oregon State Univ. Corvallis, OR 97331	Alvin W. Smith	87-CRSR-2-3166 8701891	\$30,042	07-15-87 07-31-88	Recombinant Vaccine for Ovine Footrot
Oregon State Univ. Corvallis, OR 97331	Masakazu Matsumoto	87-CRSR-2-3123 8702134	\$58,000	08-01-87 07-31-89	Secretory Antibody Response and <u>Pasteurella multocida</u> Vaccine

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Pennsylvania Philadelphia, PA 19104	Linda H. Keller	87-CRSR-2-3105 8702117	\$129,472	07-01-87 06-30-89	Avian T Cell Subset Markers as a Probe of the Immune Response to Marek's Disease
Pennsylvania State Univ. University Park, PA 16802	R. W. Scholz	87-CRSR-2-3171 8701803	\$51,621	09-15-87 09-30-88	Selenium Effects on the Arachidonic Acid Cascade in the Pathogenesis of <u>Escherichia coli</u> Mastitis in Dairy Cows
Pennsylvania State Univ. University Park, PA 16802	Richard A. Wilson	87-CRSR-2-3124 8701777	\$145,844	09-01-87 08-31-89	Phenotype and Functions of T-Lymphocytes and Lymphokines Isolated from Bovine Mammary Gland Secretion
South Dakota State Univ. Brookings, SD 57007	David A. Benfield	85-CRSR-2-2592 8702033	\$71,975	09-15-85 09-30-89	Role of Cellular Receptors in the Pathogenesis of Rotavirus and Transmissible Gastroenteritis
Agricultural Expt. Stn. Univ. of Tennessee Knoxville, TN 37901	Michael A. Breider	87-CRSR-2-3125 8701732	\$146,616	09-15-87 09-30-90	Effects of <u>Pasteurella haemolytica</u> Pathogenic Factors in Bovine Pulmonary Endothelium
Texas A & M Res. Fdn. College Station, TX 77843	James E. Womack	87-CRSR-2-3126 8701755	\$150,000	09-01-87 08-31-90	Molecular Genetics of Interferons and Resistance to Bovine Respiratory Disease

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Texas A & M Res. Fdn. College Station, TX 77843	J. W. Templeton	87-CRSR-2-3157 8701683	\$74,372	09-01-87 08-31-89	Genetic Control of Macrophage Function in Bovine Brucellosis
Washington State Univ. Pullman, WA 99164	Raymond Reeves	87-CRSR-2-3149 8701763	\$150,000	09-01-87 08-31-90	Recombinant Bovine IL-2 Enhancement of Bovine Immunity
Washington State Univ. Pullman, WA 99164	Jerry J. Reeves	87-CRSR-2-3073 8701821	\$149,972	09-01-87 08-31-90	Endocrine Control of Lactational Anestrus in Beef Cows
Washington State Univ. Pullman, WA 99164-5045	Sandra S. Ristow	87-CRSR-2-3039 8701842	\$80,000	09-01-87 02-28-89	A Battery of Monoclonal Antibodies to Detect Infectious Hematopoietic Necrosis Virus
Univ. of Wisconsin Madison, WI 53706	W. L. Castleman	87-CRSR-2-3127 8701737	\$150,000	09-15-87 09-30-89	Effects of 4-Ipomeanol on Bovine Viral and Bacterial Pneumonia
Univ. of Wisconsin Madison, WI 53706	Kevin T. Schultz	87-CRSR-2-3172 8701559	\$150,000	08-01-87 07-31-90	Molecular Characterization of the Bluetongue Neutralizing Antigen

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: ANIMAL HEALTH RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Wisconsin Madison, WI 53706	Gary A. Splitter	87-CRSR-2-3128 8701757	\$150,000	09-15-87 09-30-89	Effector Cell Recognition of BHV-1 Glycoproteins Coded by Transfected Genes
Univ. of Wisconsin Madison, WI 53706	Virginia S. Hinshaw	87-CRSR-2-3159 8702110	\$75,000	09-01-87 08-31-90	Tissue Tropism of Virulent Avian Influenza A Viruses
Univ. of Wisconsin Madison, WI 53706	Oliver J. Ginther	87-CRSR-2-3158 8701697	\$150,000	09-15-87 09-30-90	Early Embryonic Loss in Heifers
West Virginia Univ. Morgantown, WV 26506	E. Keith Inskeep	87-CRSR-2-3074 8701701	\$113,853	09-15-87 09-30-90	Roles of LH and Uterine Luteolysins in Luteal Function in Anestrous Cows
Univ. of Wyoming Laramie, WY 82071	John A. Ellis	87-CRSR-2-3079 8701694	\$144,892	09-15-87 09-30-90	Dynamics of Host-Virus Interaction in Bluetongue: Host Specific Immune Responses

TOTAL \$5,408,340

Aquaculture

The purpose of this program area is to provide and/or improve upon the scientific and technical base needed by the aquaculture industry. This industry has been expanding rapidly. Problems of nutrition, breeding, physiology, management, disease and parasite control are important and are becoming more limiting as the size of the industry and its concentration have increased.

Interest is focused on local and regional problems for which solutions will contribute to national objectives related to aquaculture production.

The specific objectives of the research are: (1) improved production efficiency through diet formulation, reproduction and breeding, and disease and parasite control; (2) improved water quality for production and control of factors affecting the quality of water discharge; and (3) increased production of freshwater species having high production potential such as catfish, trout, bait minnows, and crawfish.

SPECIAL RESEARCH GRANTS PROGRAM
PROGRAM AREA: AQUACULTURE RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of Georgia Res. Fdn. Athens, GA 30602	Vicki S. Blazer	87-CRSR-2-3040 8701592	\$19,643*	07-01-87 06-30-89	Dietary Lipid and Disease Resistance in Channel Catfish
Mississippi Agric. & Forestry Expt. Stn. Mississippi State Univ. Miss. State, MS 39762	Louis R. D'Abramo	87-CRSR-2-3041 8701555	\$64,762	07-01-87 12-31-89	Determination of Selected Nutritional Requirements of Juvenile Freshwater Prawns
Oregon State Univ. Corvallis, OR 97331	J. S. Rohovec	87-CRSR-2-3042 8701840	\$14,594	09-15-87 09-30-88	Intracellular Infections by <u>Renibacterium salmoninarum</u> and Host Response
Oregon State Univ. Corvallis, OR 97331	C. J. Bayne	87-CRSR-2-3043 8702478	\$80,000	08-01-87 07-31-89	Enhancement of Natural Immunity in Salmonids

* Split-funded with Animal Health for a total awarded amount of \$47,810.

SPECIAL RESEARCH GRANTS PROGRAM
 PROGRAM AREA: AQUACULTURE RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Clemson Univ. Clemson, SC 29634	J. R. Tomasso, Jr.	87-CRSR-2-3044 8701597	\$30,884	09-01-87 08-31-89	Optimum Transport Conditions for Red Drum Fingerlings
Texas A & M Res. Fdn. Box 3578 College Station, TX 77843	D. M. Gatlin, III	87-CRSR-2-3045 8701838	\$60,297	09-01-87 08-31-89	Effects of Dietary Fish Oil on Fatty Acid Content and Flavor of Channel Catfish

TOTAL \$270,180

RESEARCH ON AND DEVELOPMENT OF EXTERNAL COMBUSTION
ENGINES

Grants were awarded to do research on and development of external combustion engines using fuel other than that derived from petroleum and petroleum products. Proposals were considered for research and development related to the design, development, construction testing, and operation of external combustion engine systems for stationary agricultural power application using fuel other than that derived from petroleum.

RESEARCH ON AND DEVELOPMENT OF EXTERNAL COMBUSTION ENGINES
PROGRAM AREA: EXTERNAL COMBUSTION ENGINES

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Valmont Industries, Inc. Highway 275 Valley, NE 68604	James T. Mikula	87-CRSR-2-3220 8702848	\$346,777	09-15-87 08-31-89	A Biomass-fueled Stationary Power Unit for Agricultural Irrigation
Ohio State Univ. Res. Fdn. Columbus, OH 43212-1194	Harold M. Keener	87-CRSR-2-3221 8702842	\$138,223	09-15-87 09-30-89	AFBC-EC Engine System for Biomass Power

TOTAL \$485,000

RANGELAND RESEARCH GRANTS PROGRAM

Rangeland Research grants are awarded to support basic research in certain areas of rangeland research such as (1) Management of rangelands and agricultural land as integrated systems for more efficient utilization of crops and waste products in the production of food and fiber, (2) methods of managing rangeland watersheds to maximize efficient use of water and improve water yield, water quality and water conservation to protect against onsite and offsite damage of rangeland resources from floods, erosion and other detrimental influences, and to remedy unsatisfactory and unstable rangeland conditions, and (3) revegetation and rehabilitation of rangeland including the control of undesirable species of plants.

RANGELAND RESEARCH GRANTS PROGRAM
PROGRAM AREA: RANGELAND RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Univ. of California Berkeley, CA 94720	Elizabeth Bernays	87-CRSR-2-3113 8702323	\$37,591	07-01-87 06-30-88	Potential for Control of an Exotic Weed by a Native Insect
Colorado State Univ. Fort Collins, CO 80523	Wayne C. Leininger	87-CRSR-2-3114 8702351	\$78,776	09-01-87 08-31-90	Grazing Management for Efficient Water Use and Conservation in a Riparian Ecosystem
Colorado State Univ. Fort Collins, CO 80523	K. George Beck	87-CRSR-2-3168 8702332	\$31,080	08-01-87 07-31-89	Ecological Constraints to Revegetating Russian Knapweed Infested Rangeland with Grasses
Univ. of Idaho Moscow, ID 83843	Ronald Robberecht	87-CRSR-2-3169 8702354	\$51,186	08-01-87 12-31-89	Ecophysiology and Mechanisms of Adventive Species in Rangelands
Univ. of Minnesota St. Paul, MN 55104	Kent D. Olson	87-CRSR-2-3115 8702359	\$22,700	09-15-87 09-30-88	An Integrated Model of Range Management under Uncertainty
Pacific Northwest Research Station Forest Service, USDA Portland, OR 97208	Arthur Tiedemann	87-CRSR-2-3116 8702300	\$78,014	09-15-87 09-30-90	Western Juniper Influence on Nutrient Accumulation in Sagebrush/Grass Ecosystems

RANGELAND RESEARCH GRANTS PROGRAM
PROGRAM AREA: RANGELAND RESEARCH

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Utah State Univ. Logan, UT 84322-1415	Frederick Provenza	87-CRSR-2-3117 8702304	\$79,114	07-01-87 06-30-90	Grazing: Preparing Livestock to Forage in Unfamiliar Environments
Intermountain Forest & Range Exp. Stn. Forest Service, USDA Ogden, UT 84401	Susan E. Meyer	87-CRSR-2-3154 8702328	\$76,530	09-01-87 08-31-89	Interpopulational Differences in the Establishment Strategies of Range Plants

TOTAL \$454,991

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

The objectives of this program are to stimulate technological innovation in the private sector, to strengthen the role of small business in meeting Federal research and development needs, to increase private sector commercialization and development efforts, and to encourage participation of small and disadvantaged firms in technological innovation.

The program emphasizes support of high-quality research and development proposals containing advanced concepts related to important agricultural problems and opportunities that could lead to significant public benefits. The areas considered in this program are broad and encompass a wide range of agricultural sciences. The subtopics include: (1) forests and related resources, (2) plant production and protection, (3) animal production and protection, (4) air, water, and soils, (5) food science and nutrition, and (6) rural and community development.

In Fiscal Year 1987, USDA awarded both Phase I and Phase II grants. Phase I grants are primarily for research designed to determine technical feasibility of the proposed approach or concept. Phase II grants are awarded to those Phase I projects that have shown sufficient promise for further support. The total amount awarded in Fiscal Year 1987 was \$3,505,971.

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: FORESTS & RELATED RESOURCES

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Tissue-Grown Corporation 3180 Woods Circle Davis, CA 95616	Carolyn J. Sluis	87-SBIR-8-0135 8700905	\$49,950	09-01-87 02-29-88	Large Scale Micropropagation and Field Transfer Systems for Hardwood Tree Species
Foster-Miller, Inc. 350 Second Avenue Waltham, MA 02254	A. Mangolds	87-SBIR-8-0169 8702541	\$217,932	09-15-87 09-30-89	Prediction of Rock Anchor Capacities by Up-Hole Seismic Velocity Techniques
Renewable Technologies, Inc. 630 Utah, P.O. Box 4113 Butte, MT 59702	C. A. Bradley	87-SBIR-8-0168 8702530	\$217,000	09-15-87 09-30-89	Solid State Culture of Mold to Produce a Biological Pesticide Against Gypsy Moth
Corley Manufacturing Company P. O. Box 471 Chattanooga, TN 37401	Andrew J. Corley	87-SBIR-8-0137 8700845	\$50,000	09-01-87 02-29-88	Computer Directed Hardwood Edging System
AMINEX Company P. O. Box 4174 Federal Way, WA 98063-4174	Ramesh C. Vasishth	87-SBIR-8-0151 8700862	\$45,300	09-01-87 02-29-88	Dimensionally Stabilizing Waferboard by Pretreating Wood With Polymers Before Gluing

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: FORESTS & RELATED RESOURCES

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Biodyne Chemicals, Inc. 703 Hickory Farm Lane P.O. Box 7019 Appleton, WI 54914-7019	Donald E. Smith	87-SBIR-8-0144 8700779	\$40,000	09-01-87 02-29-88	Catalytic Ester Pulping of Pine

TOTAL \$620,182

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: PLANT PRODUCTION & PROTECTION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Landec Labs, Inc. 2567 Hampton Avenue Redwood City, CA 94061	Ray F. Stewart	87-SBIR-8-0152 8700886	\$43,051	09-01-87 02-29-88	Temperature-activated Insecticide and Herbicide Compositions
Plant Genetics, Inc. 1930 Fifth Street Davis, CA 95616	John C. Kao	87-SBIR-8-0154 8702564	\$210,000	09-15-87 09-30-89	A Toxin-directed Approach to Select Lettuce Resistant to Corky Root Rot
Biosis 1057 East Meadow Circle Palo Alto, CA 94303	Irene Popiel	87-SBIR-8-0157 8702560	\$210,000	09-15-87 09-30-89	Desiccation of Entomogenous Nematodes for Long-Term Mass Storage
Advanced Genetic Sciences, Inc. 6701 San Pablo Avenue Oakland, CA 94608	Hugo K. Dooner	87-SBIR-8-0136 8700824	\$49,470	09-01-87 02-29-88	Isolation of Maize Nuclear Male Sterile Genes By Transposon-Tagging
Advanced Genetic Sciences, Inc. 6701 San Pablo Avenue Oakland, CA 94608	Pamela Dunsmuir	87-SBIR-8-0162 8700826	\$49,462	09-01-87 02-29-88	Expression of a Bacterial Chitinase Gene in Plants

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: PLANT PRODUCTION & PROTECTION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
MicroGeneSys, Inc. 400 Frontage Road West Haven, CT 06516	Mark A. Cochran	87-SBIR-8-0155 8702562	\$210,000	09-15-87 09-30-89	Expression of Foreign Genes in Insects Using Recombinant Baculovirus Vectors
Aquaculture Concepts 73-1125 Alihilani Place Kailua-Kona, HI 96740	Steven A. Katase	87-SBIR-8-0159 8702586	\$230,000	09-15-87 09-30-89	Utilization of Innovative Techniques in the Production of Superior Quality Nori
Molecular Genetics, Inc. 10320 Bren Road, East Minnetonka, MN 55343	Kenneth A. Hibberd	87-SBIR-8-0145 8700816	\$49,718	09-01-87 02-29-88	Monoclonal Antibodies to a High Methionine Storage Protein of Maize
AGSCO, Inc. State Mill Road Grand Forks, ND 58201	F. R. Yagelowich	87-SBIR-8-0143 8700798	\$49,165	09-01-87 02-29-88	Seed Oil Derivatives as Adjuvants with Herbicides
Native Plants, Inc. 417 Wakara Way Salt Lake City, UT 84108	James A. Klocke	87-SBIR-8-0148 8700760	\$50,000	09-01-87 02-29-88	Insect Antifeedant Salannin, a Model for a New Commercial Insect Control Agent

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
 PROGRAM AREA: PLANT PRODUCTION & PROTECTION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Native Plants, Inc. 417 Wakara Way Salt Lake City, UT 84108	D. Shattuck-Eidens	87-SBIR-8-0149 8700811	\$50,000	09-01-87 02-29-88	Use of Transposable Elements and RFLP Mapping to Clone Quantitative Trait Loci
Miller's Machine and Metal Works 336 N. 6th Street, Highway 12 Prosser, WA 99350	Franklin W. Miller	87-SBIR-8-0156 8702587	\$131,957	09-15-87 09-30-89	Automation for Increased Productivity and Reduced Costs in Hop Production

TOTAL \$1,332,823

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
 PROGRAM AREA: ANIMAL PRODUCTION & PROTECTION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Syntro Corporation 10655 Sorrento Valley Road San Diego, CA 92121	Thomas J. Pollock	87-SBIR-8-0139 8700813	\$49,992	09-01-87 02-29-88	Vaccine for Infectious Bursal Disease Virus
Swine Graphics, Inc. P.O. Box 518 1620 Superior Street Webster City, IA 50595	W. M. Greenley	87-SBIR-8-0140 8700759	\$48,800	09-01-87 02-29-88	Enhancing Swine Profitability with a Multi-farm Financial/Biologic Database
HybriVet 32 Pinewood Road Wellesley, MA 02181	Meredith M. Hunter	87-SBIR-8-0141 8700912	\$49,995	09-01-87 02-29-88	Detection of Erythromycin in Animal-derived Products
Embrex, Inc. P. O. Box 13989 Research Triangle Park, NC 27709-3989	J. Paul Thaxton	87-SBIR-8-0161 8702526	\$180,000	09-15-87 09-30-89	Automatic Egg Injection System
Praxis Biologics, Inc. 30 Corporate Woods, Suite 300 Rochester, NY 14623	Robert N. Brey	87-SBIR-8-0146 8700827	\$50,000	09-01-87 02-29-88	A Salmonella Oral Vector as a Vaccine Candidate for Poultry

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: ANIMAL PRODUCTION & PROTECTION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Agriculture Identification Systems, Inc. 1365 Pilot Drive Cookeville, TN 38503	Charles K. Rhea	87-SBIR-8-0160 8702527	\$190,000	09-15-87 09-30-89	Research System to Measure, Collect and Save Feed, Water and Atmospheric Data
			TOTAL	\$568,787	

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: AIR, WATER & SOILS

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Humbug Mountain Research Laboratories P. O. Box 1380 Duarte, CA 91010	Alan A. Vetter	87-SBIR-8-0164 8700757	\$50,000	09-01-87 02-29-88	Combustion Enhancer for Prescription Burning of Chaparral
Mickley and Associates 752 Gapter Road Boulder, CO 80303	Michael C. Mickle	87-SBIR-8-0158 8702583	\$196,824	09-15-87 05-31-89	Charged Ultrafiltration Membrane Demineralization of Brackish Waters for Irrigation
Deerfield Controls Rand Road Shelburne Falls, MA 01370	R. J. Bargerion	87-SBIR-8-0163 8700843	\$49,633	09-01-87 02-29-88	A Flow Shaping Sluice Gate for Measuring and Controlling Water Flow
Management Information Resources 3621 Lowell Avenue Lincoln, NE 68506	Marvin Twersky	87-SBIR-8-0165 8700887	\$49,982	09-01-87 02-29-88	A Fiberoptic Probe to Simultaneously Determine Soil Water Content and Soil Temperature
			TOTAL	\$346,439	

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
PROGRAM AREA: FOOD SCIENCE & NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
CeraMem Corporation 323 Waverley Street Belmont, MA 02178	Robert L. Goldsmith	87-SBIR-8-0150 8700763	\$49,995	09-01-87 02-29-88	Low-cost Ceramic Membranes for Food Processing
Ohmicron Corporation 108 West Franklin Avenue Pennington, NJ 08534	Mark K. Malmros	87-SBIR-8-0166 8702561	\$200,000	09-15-87 09-30-89	A New Rapid Test for Salmonella Detection Using Liposome-Entrapped Molecules
Atom Sciences, Inc. 114 Ridgeway Center Oak Ridge, TN 37830	Larry J. Moore	87-SBIR-8-0153 8700888	\$49,928	09-01-87 02-29-88	Silicon Determination for Nutrition with Resonance Ionization Mass Spectrometry
American Research Corp. of Virginia P. O. Box 3406 Radford, VA 24143-3406	R. J. Churchill	87-SBIR-8-0138 8700865	\$50,000	09-01-87 02-29-88	Microwave Sensors for Machine Vision Inspection in Food Processing Systems

TOTAL \$349,923

SMALL BUSINESS INNOVATION RESEARCH PROGRAM
 PROGRAM AREA: RURAL & COMMUNITY DEVELOPMENT

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	TITLE
Thoma Ltd. 81 Main Street, Suite 25 Cortland, NY 13045	Brian Bell	87-SBIR-8-0142 8700882	\$32,125	09-01-87 02-29-88	Import Replacement - A Cost-effective Rural Development Strategy
B&E Engineering, Inc. Route 1, Box 256 Yankton, SD 57078	D. D. Eisenbraun	87-SBIR-8-0147 8700773	\$49,192	09-01-87 02-29-88	Computerized Informational System for Management of Rural County Roads
Applied Science Associates, Inc. Route 1 Fairfield, VA 24435	Walter E. Tolles	87-SBIR-8-0167 8702528	\$206,500	09-15-87 09-30-89	Sweet Sorghum for a Piedmont Ethanol Industry

TOTAL \$287,817

FOOD AND AGRICULTURAL SCIENCES NATIONAL NEEDS
GRADUATE FELLOWSHIPS GRANT PROGRAM

This program was initiated because of increasing concern about growing shortages of trained professionals in the food and agricultural sciences. The objective of the program is to encourage outstanding students (U.S. citizens) to pursue and complete a graduate degree in an area of the food and agricultural sciences for which there is a national need for the development of scientific expertise. The Fiscal Year 1987 program consisted of grants to colleges and universities with superior graduate teaching and research programs in the targeted areas of the food and agricultural sciences. Fellowships were awarded in the following areas in Fiscal Year 1987.

Biotechnology	\$ 1,824,000
Food Science/Human Nutrition	942,440
	<u>\$ 2,766,440</u>

This program is administered under the authority of Section 1417(a) (3) (B) of P.L. 95-113, as amended (7 U.S.C. 3103). Eligible institutions include all U.S. colleges and universities which confer a graduate degree in an area of the food and agricultural sciences targeted for national needs fellowships.

GRADUATE FELLOWSHIP PROGRAM
PROGRAM AREA: BIOTECHNOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	FELLOWSHIPS SUPPORTED
Univ. of California Davis, CA 95616	Eric E. Conn	87-GRAD-9-0085 8702669	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of California Riverside, CA 92521	John V. Leary	87-GRAD-9-0087 8702634	\$144,000	09-01-87 08-31-92	4 Doctoral
Univ. of California Los Angeles, CA 90024	J. P. Thornber	87-GRAD-9-0086 8702644	\$192,000	09-01-87 08-31-92	4 Doctoral
Colorado State Univ. Ft. Collins, CO 80523	G. Niswender	87-GRAD-9-0076 8702690	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of Iowa Iowa City, IA 52242	John E. Butler	87-GRAD-9-0079 8702623	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of Illinois Urbana, IL 61801	J. A. Shaddock	87-GRAD-9-0088 8702675	\$144,000	09-01-87 08-31-92	4 Doctoral

GRADUATE FELLOWSHIP PROGRAM
PROGRAM AREA: BIOTECHNOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	FELLOWSHIPS SUPPORTED
Univ. of Illinois Urbana, IL 61801	L. E. Schrader	87-GRAD-9-0089 8702681	\$96,000	09-01-87 08-31-92	4 Doctoral
Louisiana State Univ. & A&M College Baton Rouge, LA 70893	Sue G. Bartlett	87-GRAD-9-0091 8702708	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of Minnesota St. Paul, MN 55108	I. Rubenstein	87-GRAD-9-0092 8702647	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of Missouri Columbia, MO 65211	D. D. Randall	87-GRAD-9-0080 8702658	\$192,000	09-01-87 08-31-92	4 Doctoral
Cornell Univ. Ithaca, NY 14853	Roger J. Avery	87-GRAD-9-0093 8702701	\$192,000	09-01-87 08-31-92	4 Doctoral
Pennsylvania State Univ. Univ. Park, PA 16802	C. R. Baumrucker	87-GRAD-9-0082 8702627	\$96,000	09-01-87 08-31-92	4 Doctoral

GRADUATE FELLOWSHIP PROGRAM
PROGRAM AREA: BIOTECHNOLOGY

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	FELLOWSHIPS SUPPORTED
Texas A&M Univ. College Station, TX 77843	T. O. Baldwin	87-GRAD-9-0095 8702652	\$192,000	09-01-87 08-31-92	4 Doctoral
Univ. of Wisconsin Madison, WI 53706	R. D. Bremel	87-GRAD-9-0084 8702625	\$96,000	09-01-87 08-31-92	4 Doctoral

TOTAL \$1,824,000

GRADUATE FELLOWSHIP PROGRAM
PROGRAM AREA: FOOD SCIENCE

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	FELLOWSHIPS SUPPORTED
Purdue Univ. West Lafayette, IN 47907	P. E. Nelson	87-GRAD-9-0090 8702702	\$174,440	09-01-87 08-31-92	4 Doctoral
North Carolina State Univ. Raleigh, NC 27695	G. L. Catignani	87-GRAD-9-0094 8702717	\$192,000	09-01-87 08-31-92	4 Doctoral
Utah State Univ. Logan, UT 84322	J. K. Kondo	87-GRAD-9-0083 8702622	\$96,000	09-01-87 08-31-92	4 Doctoral

TOTAL \$462,440

GRADUATE FELLOWSHIP PROGRAM
PROGRAM AREA: HUMAN NUTRITION

GRANTS AWARDED FOR FISCAL YEAR 1987

ORGANIZATION	PRINCIPAL INVESTIGATOR	GRANT NUMBER PROPOSAL NUMBER	AMOUNT	AGREEMENT PERIOD FROM TO	FELLOWSHIPS SUPPORTED
Univ. of California Davis, CA 95616	R. B. Rucker	87-GRAD-9-0075 8702694	\$192,000	09-01-87 08-31-92	4 Doctoral
Univ. of Georgia Athens, GA 30602	C. D. Berdanier	87-GRAD-9-0077 8702611	\$96,000	09-01-87 08-31-92	4 Doctoral
Univ. of Iowa Iowa City, IA 52242	Samuel J. Fomon	87-GRAD-9-0078 8702661	\$96,000	09-01-87 08-31-92	4 Doctoral
Cornell Univ. Ithaca, NY 14853	M. C. Nesheim	87-GRAD-9-0081 8702624	\$96,000	09-01-87 08-31-92	2 Doctoral

TOTAL \$480,000

SCIENTISTS WHO SERVED ON USDA/CSRS PEER REVIEW PANELS FOR FISCAL YEAR 1987

Scientists from government, universities, industry served on USDA/CSRS peer review panels this past year. Each panel was put together to fit the expertise needed for that specific granting area. The scientists involved are listed below alphabetically within their respective States.

ALABAMA

Judy Bonner
University of Alabama

Cindy Brunner
Auburn University

George Cooper
Alabama A&M University

Johanna Allston Griffin
University of Alabama

Edward M. Jenkins
Tuskegee Institute

Dennis Marple
Auburn University

Ruen C. Tang
Auburn University

Brian Truelove
Auburn University

ARKANSAS

Delbert Gatlin
University of Arkansas

Rose C. Gergerich
University of Arkansas

ARIZONA

John Enemark
University of Arizona

Darrell E. Goll
University of Arizona

J. O. Klemmenson
University of Arizona

Roger A. Sunde
University of Arizona

Michael R. Wagner
Univ. of Arizona

CALIFORNIA

Ransom Baldwin
University of California

George E. Bruening
University of California

Michael L. Bruss
University of California

L. B. Corbeil
University of California

Charles W. Daniel
University of California

Sean S. Duffy
University of California

Jan Dvorak
University of California

Robert Fischer
University of California

CALIFORNIA-continued

Dennis Focht
University of California

Sarjeet S. Gill
University of California

Arthur Grossman
Carnegie Institute of
Washington

Dwight Charles Hirsh
University of California

Stephen H. Howell
University of California

Wesley M. Jarrell
University of California

Pal Maliga
Advanced Genetic Science,
Inc.

Mark Matthews
University of California

Edward S. Mocarski
Stanford University School
of Medicine

CALIFORNIA-continued

Donald J. Nevins
University of California

Melvin Okamura
University of California

Robert Pearcy
University of California

Ronald R. Sederoff
Forest Service, USDA

Elaine M. Tobin
University of California

Dan Walker
San Jose State University

Linda L. Walling
University of California

Richard Yamamoto
University of California

Tilahun Yilma
University of California

COLORADO

Patrick Joseph Brennan
Colorado State University

J. C. DeMartini
Colorado State University

Robert P. Ellis
Colorado State University

Terry Nett
Colorado State University

Lee E. Sommers
Colorado State University

Stephen Wallner
Colorado State University

CONNECTICUT

Harold R. Behrman
Yale University School
of Medicine

Gary Brudvig
Yale University

DISTRICT OF COLUMBIA

John L. Artz
ES, USDA

Earle E. Gavett
OE, USDA

Billy Hooper
Association of American
Veterinary Medical Colleges

McKinley Mayes
CSRS, USDA

Boyd Post
CSRS, USDA

Patrick L. Sutton
Department of Energy

Steve Zobrisky
CSRS, USDA

DELAWARE

Bruce Diner
Dupont Experiment Station

DELAWARE-continued

John E. Dohms
University of Delaware

FLORIDA

Peggy R. Borum
University of Florida

Patrick D. Greany
ARS, USDA

Edward M. Hoffman
University of Florida

Lonnie O'Neal Ingram
University of Florida

Alfred M. Merritt
University of Florida

Robert M. Peart
University of Florida

Ralph Prince
NASA

FLORIDA-continued

Charles P. Reid
University of Florida

Ronald Schmidt
University of Florida

William Thatcher
University of Florida

GEORGIA

James L. Butler
ARS, USDA

Dennis Campion
ARS, USDA

Wayne Haines
International Paper Co.

Lois K. Miller
University of Georgia

William R. Ragland
University of Georgia

GEORGIA-continued

Gregory Schmidt
University of Georgia

Harry E. Sommer
University of Forest
Resources

HAWAII

Bruce E. Tabashnik
University of Hawaii

IDAHO

James L. Kingery
University of Idaho

ILLINOIS

Janice M. Bahr
University of Illinois

May P. Berenbaum
University of Illinois

Timothy Allyn Bertram
University of Illinois

ILLINOIS-continued

Jeffrey O. Dawson
University of Illinois

Stephen K. Farrand
University of Illinois

Mary Hunzicker-Dunn
Northwestern University
Medical School

Keith W. Kelley
University of Illinois

Mary F. Picciano
University of Illinois

John A. Shadduck
College of Veterinary
Medicine

John Whitmarsh
University of Illinois

INDIANA

Peter E. Dunn
Purdue University

INDIANA-continued

Stanton B. Gelvin
Purdue University

P. Michael Hasagawa
Purdue University

Larry F. Huggins
Purdue University

Niels Nielsen
Purdue University/ARS

Suzanne Nielsen
Purdue University

IOWA

Lloyd Anderson
Iowa State University

Donald C. Beitz
Iowa State University

Charlotte Bronson
Iowa State University

IOWA-continued

Norman F. Cheville
National Animal Disease
Center

Edward L. Jeska
Iowa State University

Howard D. Lehmkuhl
National Animal Disease
Center

Donald M. Mock
University of Iowa

Richard Ross
Iowa State University

Martin H. Spalding
Iowa State University

Charles O. Thoen
Iowa State University

KANSAS

William J. Bell
University of Kansas

Duane L. Davis
Kansas State University

Harish C. Minocha
Kansas State University

Peter Wong
Kansas State University

KENTUCKY

J. M. Baskin
University of Kentucky

Joe Chappell
University of Kentucky

Robert Shepherd
University of Kentucky

LOUISIANA

Fred M. Enright
Louisiana State University

Abner M. Hammond
Louisiana State University

Robert Romaine
Louisiana State University

MARYLAND

Bradford Berry
ARS, USDA

Ram Chandra
ARS, USDA

Carolyn Clifford
Division of Cancer Prevention
and Control

Jerry D. Cohen
ARS, USDA

MARYLAND-continued

Alan Collmer
University of Maryland

Peter B. Cregan
ARS, USDA

Fran Cronin
Human Nutrition Information
Service, USDA

Ronald Fayer
ARS, USDA

John D. Gearhart
Johns Hopkins University

Albert J. Guidry
ARS, USDA

Herschel H. Klueter
ARS, USDA

Anthony Kotula
ARS, USDA

MARYLAND-continued

Colonel Harold Lupton
U.S. Army Medical Center

Warren W. Marguardt
University of Maryland

Kasuto Ono
ARS, USDA

Graham Purchase
ARS, USDA

Caird E. Rexroad, Jr.
ARS, USDA

Dinah Singer
National Institute of Health

Charles Jeffery Smith
National Institute of Health

Jim Smith
ARS, USDA

MARYLAND-continued

David B. Snyder
University of Maryland

Robert Wall
ARS, USDA

MASSACHUSETTS

John Biggers
Harvard Medical School

Francis C. Cannon
Biotechnica International

Joseph S. Elkinton
University of Massachusetts

Trudy G. Morrison
University of Massachusetts
Medical School

Ruth Tanner
University of Lowell

MICHIGAN

Jerry B. Dodgson
Michigan State University

Douglas Foster
University of Michigan

Ray Hammerschmidt
Michigan State University

Lee W. Jacobs
Michigan State University

Peter Laks
Michigan Technological
University

John Ohlrogge
Michigan State University

Dale R. Romsos
Michigan State University

Kenneth Sink
Michigan State University

MINNESOTA

Robert M. Brambl
University of Minnesota

Eugenia A. Davis
University of Minnesota

Gary Heichel
ARS, USDA

Anne Kapuscinski
University of Minnesota

S. Mahaswaran
University of Minnesota

David Jesse McKean
Mayo Clinic

Thomas W. Molitor
University of Minnesota

MISSISSIPPI

Marshall Bealeu
Mississippi State University

MISSISSIPPI-continued

Steve O. Duke
ARS, USDA

Keith R. Hopper
ARS, USDA

William T. Nearn
Mississippi State Univ.

MISSOURI

John M. Berg
University of Missouri

Dale Blevins
University of Missouri

Brian Clevinger
Washington University

Bruce E. Cutter
University of Missouri

MISSOURI-continued

Steve G. Pallardy
University of Missouri

Stephen G. Rogers
Mosanto Company

Martin Sachs
Washington University

Robert Sharp
University of Missouri

Robert F. Solorzano
University of Missouri

Martin H. Spalding
University of Missouri

MONTANA

Peter Kock
Wood Science Laboratory, Inc.

NEBRASKA

John Schmitz
University of Nebraska

NEW HAMPSHIRE

Thomas C. Harrington
University of New Hampshire

Albert E. Luloff
University of New Hampshire

David R. Schumann
Forest Service, USDA

NEW JERSEY

Arnold E. Denton
Campbell Soup Company

John W. Einset
Princeton University

Randy R. Gaugler
Rutgers University

Paul Mathewson
Nabisco Brands

Joachim Messing
Rutgers University

NEW JERSEY-continued

Colin Scanes
Rutgers University

Roger E. Wyse
Rutgers University

NEW MEXICO

Peter Lammers
New Mexico State University

Peter J. Wierenga
New Mexico State University

NEW YORK

Phillip Ammirato
Columbia University

Jeremy Bruenn
State University of New York

Henry R. Bungay, III
Rensselaer Polytechnic
Institute

NEW YORK-continued

Timothy J. Fahey
Cornell University

David H. Griffin
State University of New York

Thomas LaRue
Cornell University

Ronald R. Minor
Cornell University

Daphne A. Roe
Cornell University

Wendell L. Roelofs
Cornell Experiment Station

Leland R. Schroeder
State University of New York

Roger M. Spanswick
Cornell University

NEW YORK-continued

Steven D. Tanksley
Cornell University

Hans VanEtten
Cornell University

Daniel Walton
State University of New York

Harry A. Wood
Boyce Thompson Institute

NORTH CAROLINA

John B. Anderson
University of North Carolina

Jack Britt
North Carolina State
University

Wayne Brooks
North Carolina State
University

NORTH CAROLINA-continued

Leroy Coggins
North Carolina State
University

Peggy Foegedine
North Carolina State
University

Lawrence I. Gilbert
University of North Carolina

Irving S. Goldstein
North Carolina State
University

C. A. Panton
North Carolina A&T State
University

David Schomberg
Duke University

NORTH DAKOTA

Richard Rathge
North Dakota State University

NORTH DAKOTA-continued

David D. Rock
North Dakota State University

Malcolm H. Smith
North Dakota State University

OHIO

Alan G. Goodridge
Case Western Reserve
University

George Steven Krakowka
Ohio State University

Lawrence Madden
Ohio Agric. Res. & Devel.
Center

John H. Nilson
Case Western Reserve
University

Linda Reif
Ohio State University

Jeffrey Robbins
University of Cincinnati

OHIO-continued

Yehia M. Saif
Ohio Agricultural Research
and Development Center

William A. Tomazic
NASA

Michael R. Wagner
Ohio State University

Frank W. Whitmore
Ohio State University

OKLAHOMA

Margaret Essenberg
Oklahoma State University

David W. Meinke
Oklahoma State University

Esther Winterfeldt
Oklahoma State University

OREGON

Peter Bottomley
Oregon State University

Rene Feyereisen
Oregon State University

William M. Hearon
Consultant

Gary F. Merrill
Oregon State University

John Rohovec
Oregon State University

Alvin R. Smith
Oregon State University

James B. Wilson
Oregon State University

PENNSYLVANIA

Andrew N. Binns
University of Pennsylvania

PENNSYLVANIA-continued

Paul Blankenhorn
Pennsylvania State University

Daniel Cosgrove
Pennsylvania State University

Paul Dimick
Pennsylvania State University

Roy Hammerstedt
Pennsylvania State University

Susan Heyner
Albert Einstein Medical
Center

Janet A. Sawicki
Wistar Institute

John E. Smith
Pennsylvania State University

Richard Whiting
ARS, USDA

PENNSYLVANIA-continued

C. Shannon Stokes
Pennsylvania State University

SOUTH CAROLINA

David Heckel
Clemson University

SOUTH DAKOTA

David F. Francis
South Dakota State University

TENNESSEE

Karen W. Hughes
University of Tennessee

Bill Simco
Memphis State University

TEXAS

Ray Nolan Clark
ARS, USDA

TEXAS-continued

Don E. Etheridge
Texas Tech

Delbert Gatlin
Texas A&M University

Marvin K. Harris
Texas A&M University

R. W. Loan
Texas A&M University

Stewart McConnell
Consultant

Mary Ann Rankin
University of Texas

Harold H. Sandstead
University of Texas Medicine
Branch

Joseph A. Veech
ARS, USDA

TEXAS-continued

Dan L. Wheat
University of Texas

UTAH

Neal Van Alfen
Utah State University

Douglas Johnson
Utah State University

James N. Long
Utah State University

Frederick D. Provenza
Utah State University

VIRGINIA

George E. Bunce
Virginia Polytechnic
Institute & State University

Jiann-Shin Chen
Virginia Polytechnic
Institute & State University

VIRGINIA-continued

Norman G. Lewis
Virginia Polytechnic
Institute & State University

David J. Parrish
Virginia Polytechnic
Institute & State University

Eugene M. Wengert
Virginia Polytechnic
Institute & State University

WASHINGTON

Paul E. Baker
Immunex Corporation

Frank C. Beall
Weyerhaeuser Corporation

Dennis Gross
Washington State University

William Hershberger
University of Washington

WASHINGTON-continued

John N. Thompson
Washington State University

Roger Timmis
Weyerhaeuser Corporation

Richard B. Wescott
Washington State University

WEST VIRGINIA

Jack E. Coster
West Virginia University

John B. Crist
Forest Service, USDA

Robert A. Dailey
West Virginia University

E. Keith Inskeep
University of West Virginia

WISCONSIN

Rajai H. Atalla
Institute of Paper Chemistry

Norlin J. Benevenga
University of Wisconsin

Michael T. Collins
University of Wisconsin

Raymond P. Guries
University of Wisconsin

WISCONSIN-continued

Kent T. Kirk
Forest Service, USDA

James D. McNatt
Forest Service, USDA

Kenneth D. Noel
Marquette University

Marion O'Leary
University of Wisconsin

Kenneth F. Raffa
University of Wisconsin

